THE TIOGA GROUP

INLAND PORT FEASIBILITY STUDY

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Task 1&2 Draft Report

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I. Background and Scope

Background

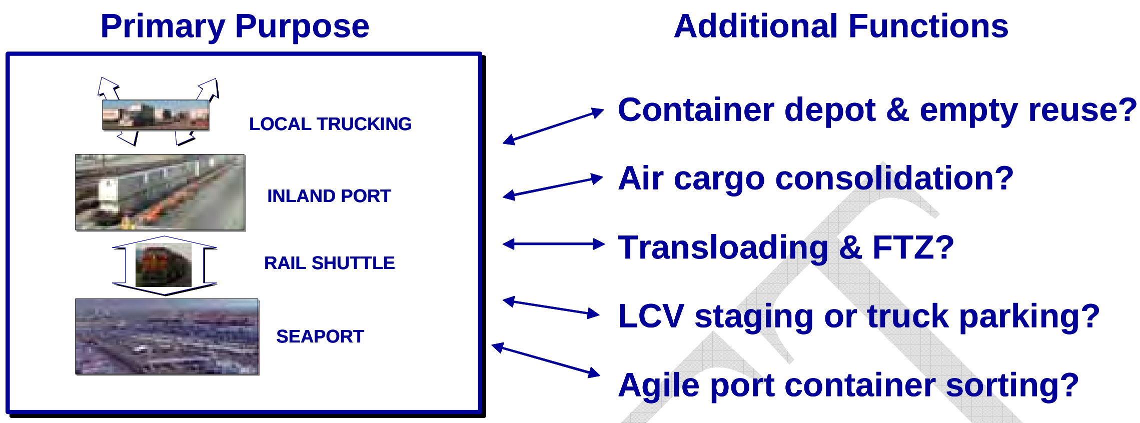
SCAG and other agencies are confronting serious long-term freight mobility issues in Southern California. Straightforward capacity increases that worked in the past – more highways, larger ports – are not enough for the future. Moreover, capacity increases that compromise the environment, tax the budget, and impinge on sensitive communities may no longer be possible or desirable.

Inland Ports and related initiatives have been proposed as solutions to freight mobility issues. The basic form of the inland port concept is illustrated in Exhibit 1. As originally implemented in the Virginia Inland Port, the concept calls for a rail shuttle linking a seaport with an inland terminal functioning as a satellite.

Exhibit 1: Basic Inland Port Concept

As Exhibit 2 suggests, the concept has been expanded to include other transportation and logistics functions, and could be expanded further.

Exhibit 2: Expanded Inland Port Concept



These concepts in their many forms appear to hold considerable promise as part of a comprehensive regional strategy. The limited experience with inland ports in the US, however, does not by itself provide SCAG and other agencies with sufficient guidance to determine which inland port facilities and functions would be feasible and cost-beneficial in Southern California.

SCAG has set the following major goals for this study.

- Determine the relevant purpose and benefits of an inland port for the SCAG Region and the various functions it might usefully include.
- Identify the potential utility of an inland port to users and stakeholders in the goods movement system.
- Identify the potential for freight traffic congestion relief, emissions mitigation, and rationalization of regional land use patterns.

A rail shuttle connecting the seaports with an inland facility could have the potential to simultaneously reduce truck traffic and congestion and promote jobs and economic growth inland. Intermodal transportation offers attractive flexibility to planners seeking long-term solutions to goods movement problems. A rail shuttle connecting major ports with nearby inland destinations would be a logical extension of the success enjoyed by long-haul double-stack container trains and landbridge services.

- From a public transportation policy and planning perspective there may be opportunities to either decrease total VMT associated with these functions or manage tradeoffs between transportation and other considerations.
- From port throughout perspective, development of an inland port and implementation of “agile port” concepts may allow the Ports to handle expected growth more efficiently.
- From an economic development perspective there may be opportunities to locate new types of businesses inland and expand the scope of others.

- From a land-use perspective there may be opportunities to rationalize legacy development patterns near ports. Container depots and the truck trips they generate, for example, are unpopular with residential and commercial users.

With new federal funding becoming available for intermodal projects, new interest in freight issues on the part of California state government, and ongoing debate over the regional impact of trade growth, the time is right to take the inland port/rail shuttle concept to the next level of analysis and potential implementation.

Scope of Work

The broad potential benefits of an inland port include facilitating goods movement, encouraging economic development, reducing traffic congestion, and otherwise promoting the regional objectives of the 2004 RTP. The overall study objective is to determine which of these benefits can be realized, in which kinds of facilities, and at which sites.

To attain this objective the study scope will cover the following Tasks.

- Task 1: Define the concept and purpose of an Inland Port facility. As the Technical Approach explains, the study team will develop multiple Inland Port scenarios to allow for multiple feasible combinations of functions. *(In this report)*

- Task 2: Describe existing Inland Port concepts in the SCAG Region. The study team will expand the scope of Task 2 to also consider: 1) existing regional facilities performing "inland port" functions; and 2) inland ports and related facility examples in other regions. *(In this report, case studies in the Appendix.)*

- Task 3: Conduct interviews and surveys to determine feasibility, potential demand, and community acceptance. In this phase, the study team will determine the operational, physical, and economic feasibility of the concepts and scenarios developed in Task 1, separately and in combination.

- Task 4: Estimate the costs and benefits. The study team will estimate the full range of capital, operating, and environmental costs for the feasible concepts and scenarios emerging from Task 3. The costs will be compared with the public and private benefits to identify and prioritize cost-effective inland port approaches.

- Task 5: Final Report and Site Evaluation. The study team will match viable cost-beneficial inland port concepts with appropriate sites in the SCAG Region. The study team will develop site requirements for successful inland port implementation and then evaluate specific proposed sites against those requirements. The findings, evaluations, and conclusions will be compiled in a fully documented final report and associated data.

The completed feasibility study will enable SCAG and other agencies to navigate through the myriad possible inland port concepts and focus on those with the best chance of real world implementation and concrete public benefits.

II. Inland Port Goals and Purposes

Reducing Truck VMT and Emissions

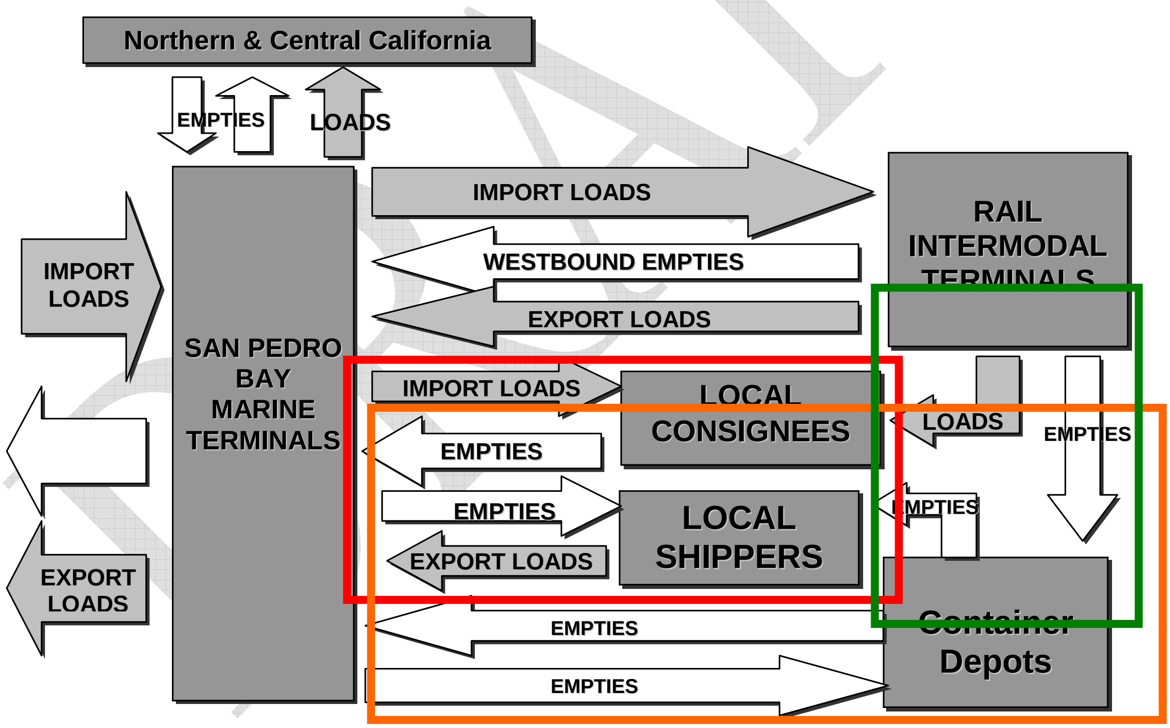
From most perspectives the primary goal of inland port development would be net reductions in truck VMT and total emissions for port traffic. The idea of an intermodal rail shuttle (or possibly an alternative line haul technology) between the ports and the inland port is an integral part of the concept.

Southern California Regional Container Flows

The ability of an inland port/rail shuttle combination to reduce net truck VMT and regional emissions depends, first and foremost, on the container flows it can transport and divert from over-the-road (OTR) trucking.

As Exhibit 3 (taken from the SCAG *Empty Ocean Container Logistics Study*) illustrates, there is not just one container flow, but a number of individual flows.

Exhibit 3: SCAG Region International Container Flows



The primary object of implementing a rail shuttle is to shift some of the local import and export moves now made by truck (outlined in red in Exhibit 3) to rail/truck combinations. The potential contribution of an inland port/rail shuttle combination, however, may be significantly greater.

As the *Empty Ocean Container Logistics Study* established, there is a very substantial movement of empty containers between local consignees, local shippers, port-area container depots, and marine terminals (outlined in orange). Diverting some of these flows to rail, and encouraging the relocation of depots to an inland port, would also serve SCAG's goals and objectives.

Finally, there are also a number of westbound domestic “backhaul” movements in marine containers into the SCAG region from points east, mostly by rail. These flows (outlined in green) result in empty marine containers in the Inland Empire and other regional concentrations. Some of these marine containers are currently returned to BNSF’s San Bernardino intermodal terminal and periodically moved to Hobart by rail and trucked to the ports. To the extent that more of these containers could be returned by rail or their drayage trips shortened, SCAG’s objectives would also be served.

Local Port Truck Trips

Most of the flows discussed above are linked to the ports, and were the subject of recent truck driver surveys. The results of these surveys were made available by the ports for use in this study.

Exhibit 4 displays daily and annual estimated 2005 and 2010 port truck trips derived from the driver surveys and port forecasts.

Exhibit 4: Estimated Truck Trips from Port Driver Surveys[1]

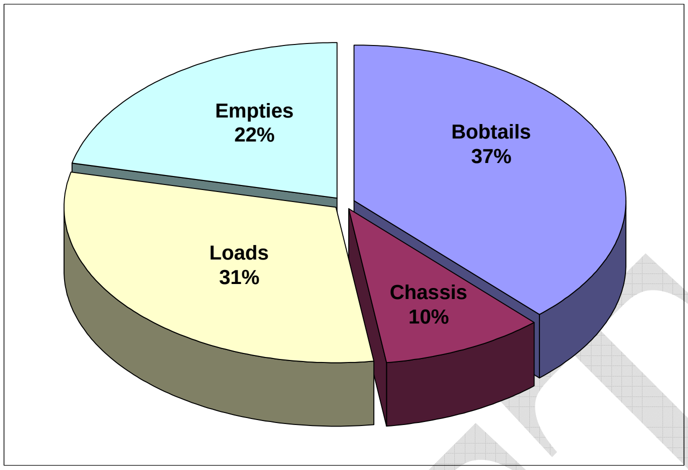
2005 Truck Trips	Bobtails		Chassis		Loads		Empties		Total	
	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports
Per Day Totals	10,507	10,023	3,148	2,179	4,840	11,740	8,384	3,242	26,878	27,185
Annual Total	2,927,114	2,792,536	877,145	607,128	1,348,437	3,270,873	2,335,643	903,269	7,488,340	7,573,806

2010 Truck Trips	Bobtails		Chassis		Loads		Empties		Total	
	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports	Arrival/ Export	Departure/ Imports
Per Day Totals	12,527	11,879	3,639	2,717	5,562	16,097	12,397	3,962	34,125	34,655
Annual Total	3,489,976	3,309,494	1,013,952	756,854	1,549,450	4,484,659	3,453,861	1,103,899	9,507,238	9,654,906
Share of Total	19%	19%	6%	4%	9%	22%	16%	6%	50%	50%

As Exhibit 5 shows, the loaded moves that drive the system account for a little less than a third of the total. It is therefore imperative to account for the empty container, bare chassis, and bobtail moves in both designing the system and estimating its impacts.

[1] Note the nomenclature conventions, which are based on the marine terminal gate perspective. “Arrivals” are inbound at the gate and include export loads, export empties, inbound empty chassis, and inbound bobtails. “Departures” are outbound from the gate and include import loads, empty containers for export loading, outbound empty chassis, and outbound bobtails.

Exhibit 5: Truck Trip Shares



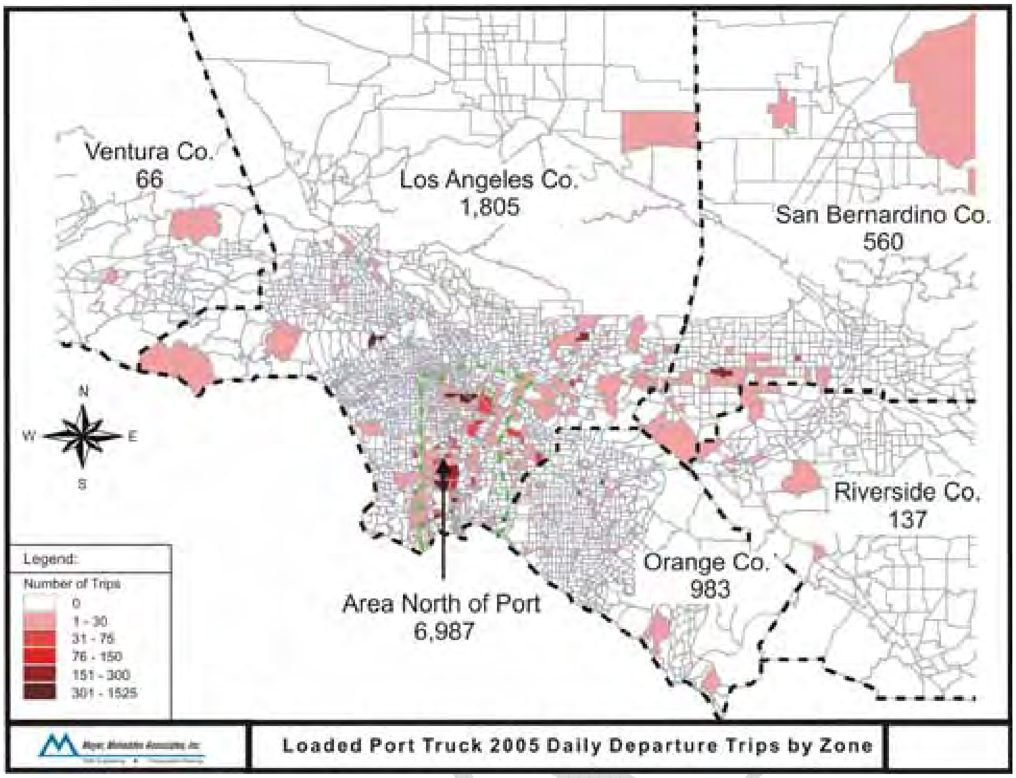
Previous port trucking studies have divided the flows by county, with the area immediately north of the ports separated out from the rest of Los Angeles County. This study follows that convention. The data for daily loaded container truck trips are summarized accordingly in Exhibit 6.

Exhibit 6: Regional Loaded Port Truck Shares

2005 Loaded Trucks	Port Area	Other LA Co.	Inland Empire	Ventura & Orange Cos.	Total
Import Loads (Departures)	66%	17%	7%	10%	100%
Export Loads (Arrivals)	58%	20%	8%	14%	100%
Total Loads	**64%**	**18%**	**7%**	**11%**	**100%**

Exhibit 7 shows the port survey data for loaded truck moves allocated to Transportation Analysis Zones. The concentration of activity immediately north of the ports is obvious. Within the Inland Empire of San Bernardino and Riverside Counties, port truck traffic is concentrated around the Ontario Airport and in the adjacent Mira Loma area. Exhibit 8 displays the same data for total trips, including empty containers, bare chassis, and bobtails. Exhibit 9 and Exhibit 10 are parallel tables for estimated 2010 trips.

Exhibit 7: 2005 Loaded Truck Departures (Imports) and Arrivals (Exports)



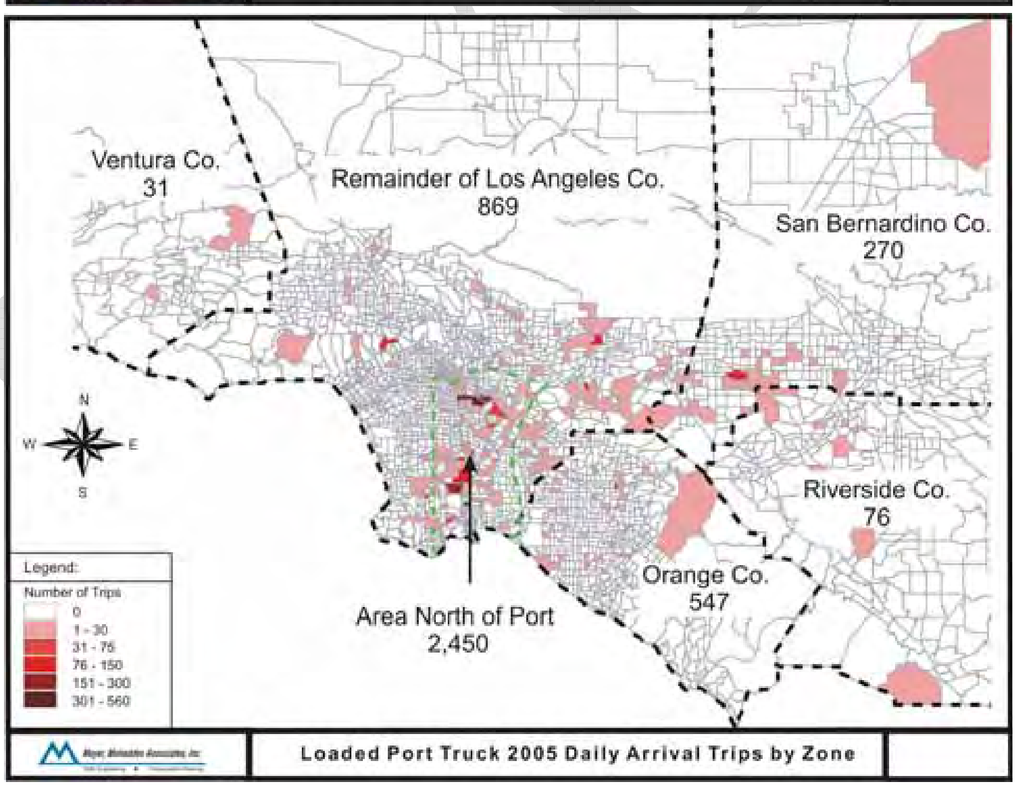
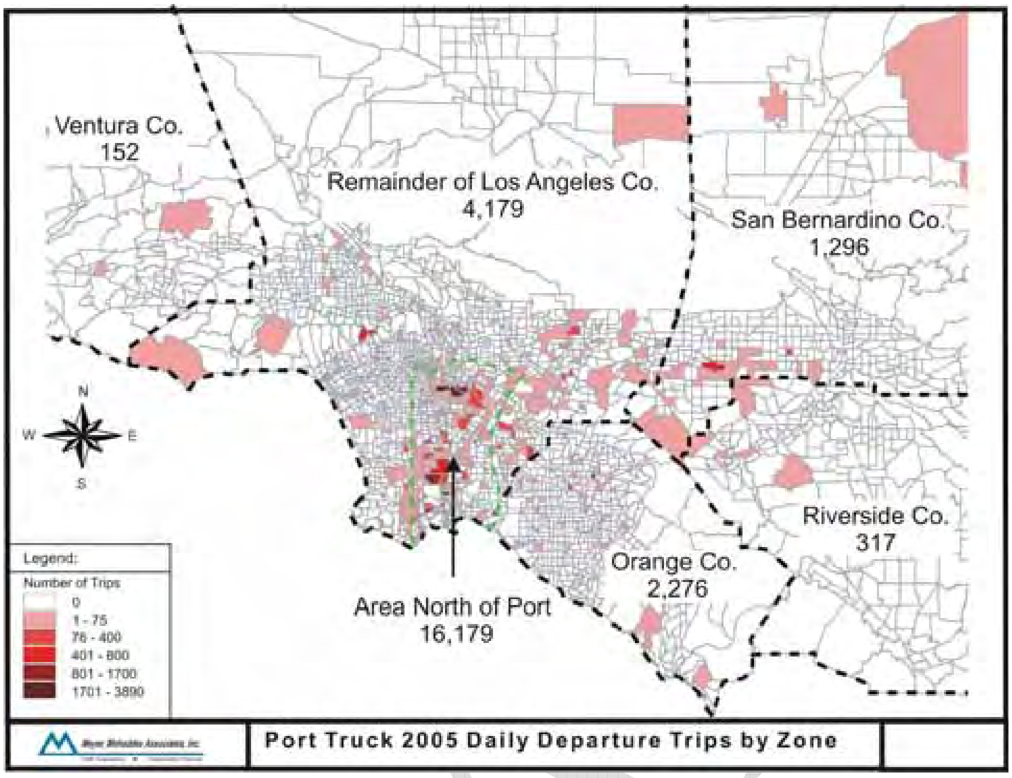


Exhibit 8: 2005 Total Departures (from Port Gates) and Arrivals (to Port Gates)



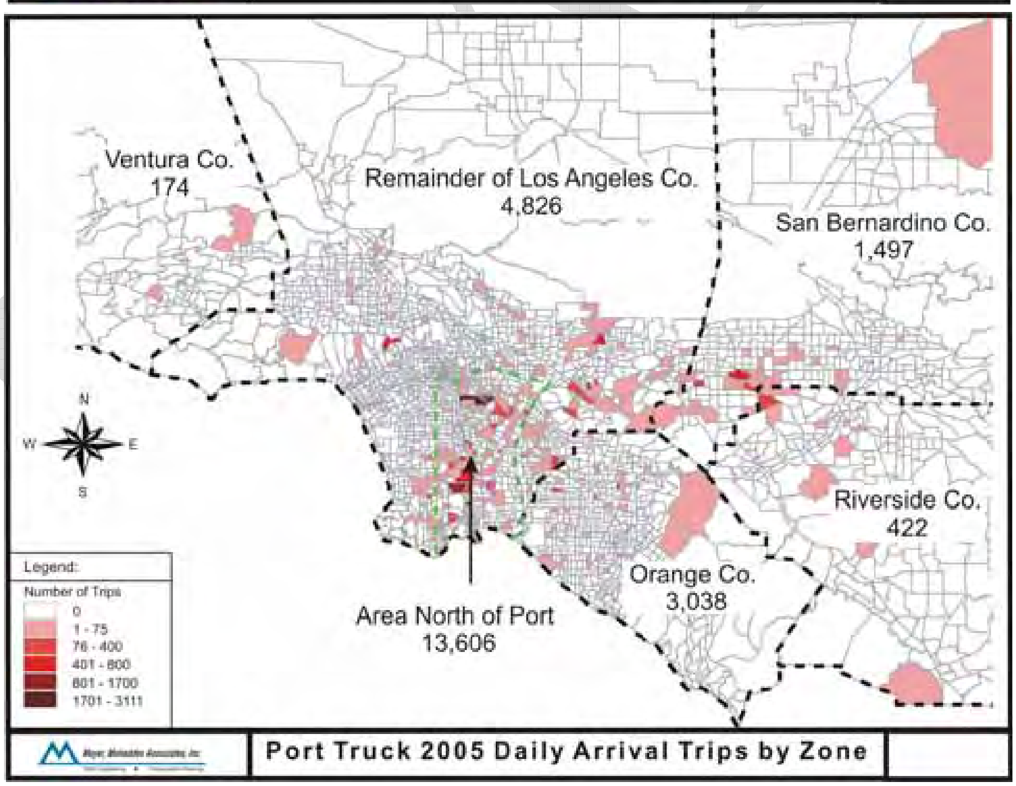


Exhibit 9: 2010 Loaded Truck Departures (Imports) and Arrivals (Exports)

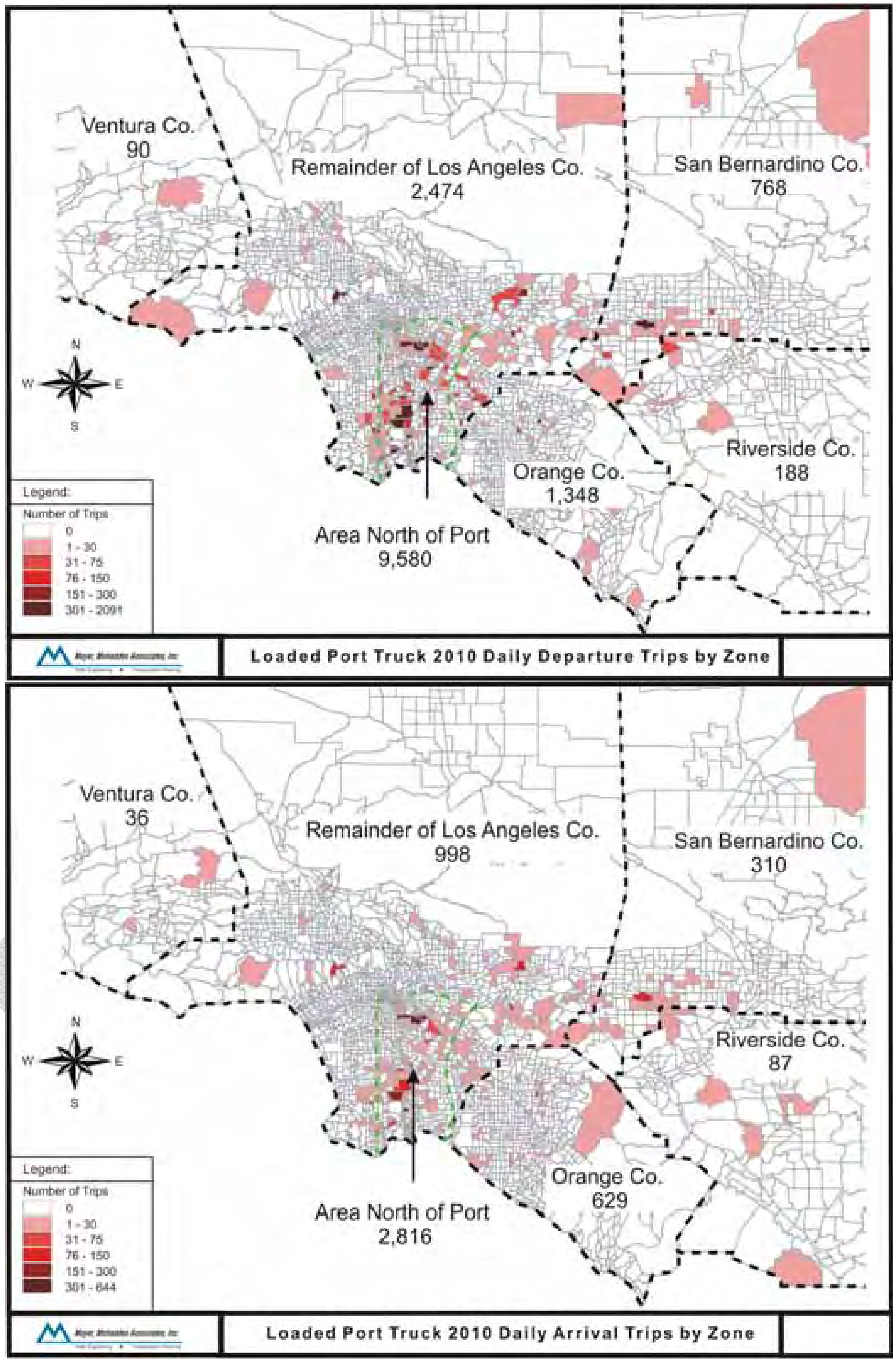
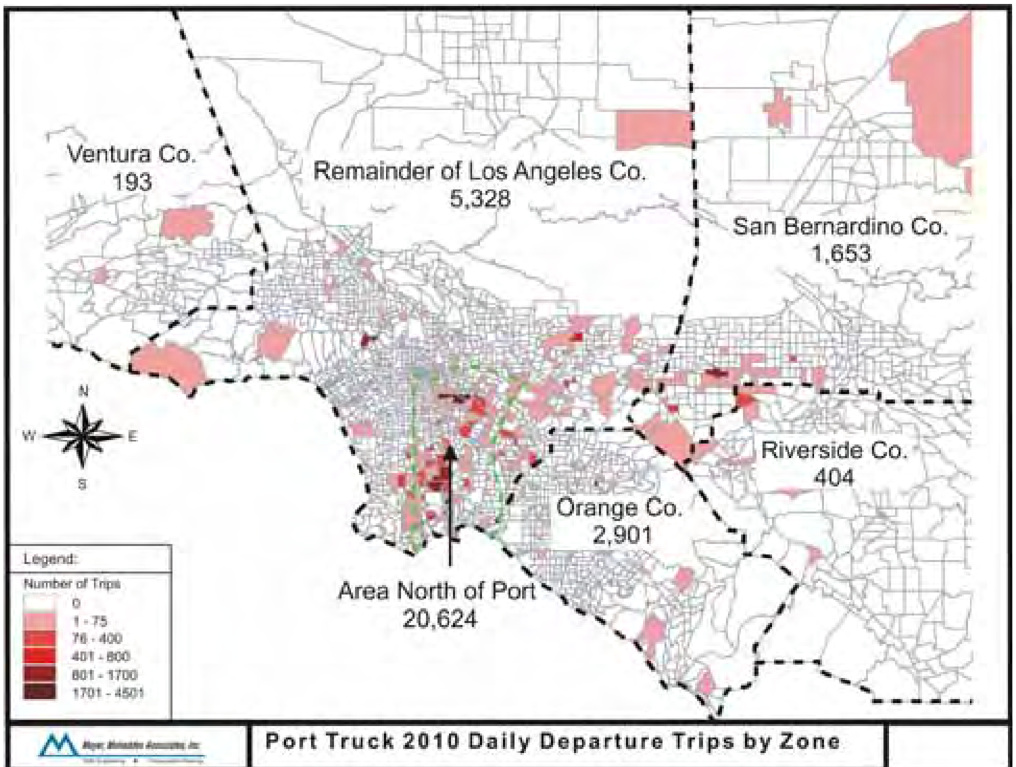
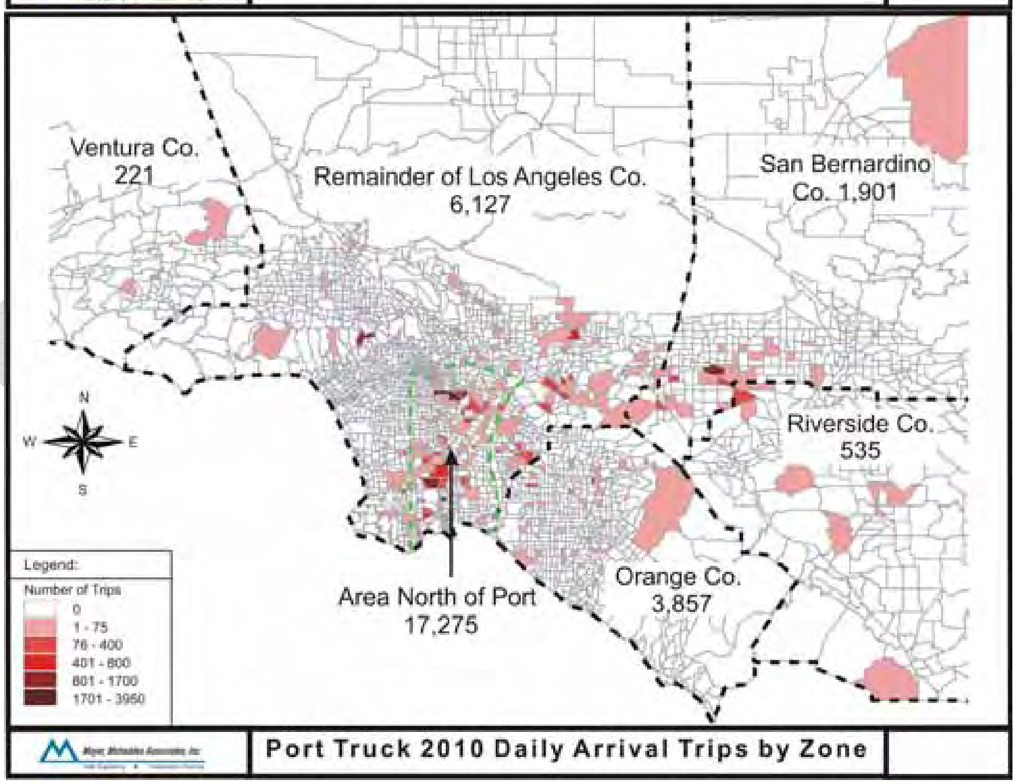


Exhibit 10: 2010 Total Departures (from Port Gates) and Arrivals (to Port Gates)





The truck trip data shown in Exhibit 7 through Exhibit 10 are summarized for the Inland Empire counties in Exhibit 11 and expanded to annual equivalents. In 2005, there were an estimated daily total of 3,532 truck trips between the Ports and the Inland Empire counties, of which 1,613 were port to region (eastbound) and 1,919 were region to port (westbound).

Exhibit 11: Estimated 2005 and 2010 Port Truck Trips to Inland Empire Counties

2005 Truck Flows	**Daily**			**Annual**		
	San Bernardino	**Riverside**	**Total**	**San Bernardino**	**Riverside**	**Total**
Port to Region						
Import Loads	560	137	697	156,016	38,168	194,184
Empties, Chassis, Bobtails	736	180	916	205,050	50,148	255,198
Subtotal	1,296	317	1,613	361,066	88,316	449,382
Region to Port						
Export Loads	270	76	346	75,222	21,174	96,396
Empties, Chassis, Bobtails	1,227	346	1,573	341,842	96,396	438,238
Subtotal	1,497	422	1,919	417,064	117,569	534,633
Total						
Loads	830	213	1,043	231,238	59,342	290,580
Empties, Chassis, Bobtails	1,963	526	2,489	546,892	146,544	693,435
Grand Total	**2,793**	**739**	**3,532**	**778,130**	**205,885**	**984,015**
2010 Truck Flows	**Daily**			**Annual**		
	San Bernardino	**Riverside**	**Total**	**San Bernardino**	**Riverside**	**Total**
Port to Region						
Import Loads	768	188	956	213,965	52,377	266,342
Empties, Chassis, Bobtails	885	216	1,101	246,561	60,178	306,739
Subtotal	1,653	404	2,057	460,526	112,554	573,080
Region to Port						
Export Loads	310	87	397	86,366	24,238	110,604
Empties, Chassis, Bobtails	1,591	448	2,039	443,253	124,813	568,065
Subtotal	1,901	535	2,436	529,619	149,051	678,670
Total						
Loads	1,078	275	1,353	300,331	76,615	376,946
Empties, Chassis, Bobtails	2,476	664	3,140	689,814	184,990	874,804
Grand Total	**3,554**	**939**	**4,493**	**990,144**	**261,605**	**1,251,750**

The underlying Inland Empire market appears to be large enough for rail service. By current standards a full double-stack container train carries between 200 and 300 containers, with the railroads attempting to increase the average total in a quest for efficiency and capacity utilization. If 50 containers is envisioned as a start-up or demonstration train size and 100 containers can be envisioned as a short shuttle train, there is enough business in the market to support a short daily train each way for each railroad (200 containers each way) with a small initial market share.

While loaded and empty containers are clearly part of the potential rail shuttle market, bare chassis movements will require additional study to determine which, if any, would be candidates for a rail shuttle. Many bare chassis are trucked between port terminals, rail terminals, and container depots, but there would rarely be a reason to move a bare chassis to or from a customer location. Bobtail movements will also require additional study. Bobtail tractors will not move on the rail shuttle, but some of their activity will be transferred to the inland locations.

Preliminary Inland Port Potential

Exhibit 12 shows the locations of over 1000 regional distribution centers (DCs). The same Ontario/Mira Loma concentration shown in the port survey data is apparent in this map. The study team developed a preliminary analysis of the potential for an inland port/rail shuttle serving this DC concentration as an indication of the overall potential of the inland port concept in reducing truck VM and emissions.

Exhibit 12: Regional Distribution Centers

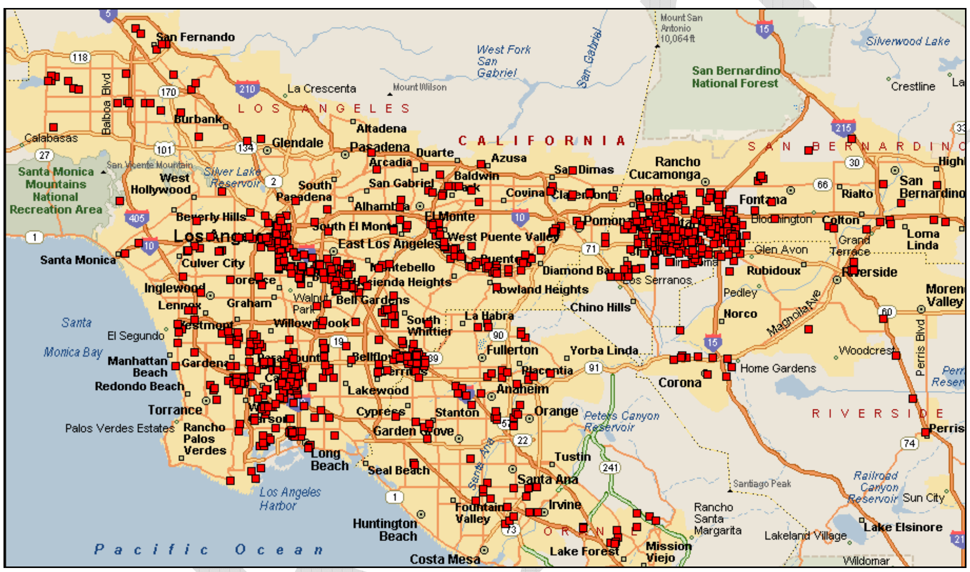


Exhibit 13 shows estimated drayage times to inland areas under congested highway conditions (30 mph on highways and 20 mph on surface streets). Under those conditions, the 56.5-mile drayage times to the large concentration of DCs in the Ontario Airport/Mira Loma area are 120-150 minutes.

Exhibit 13: Port to DC Congested Travel Times

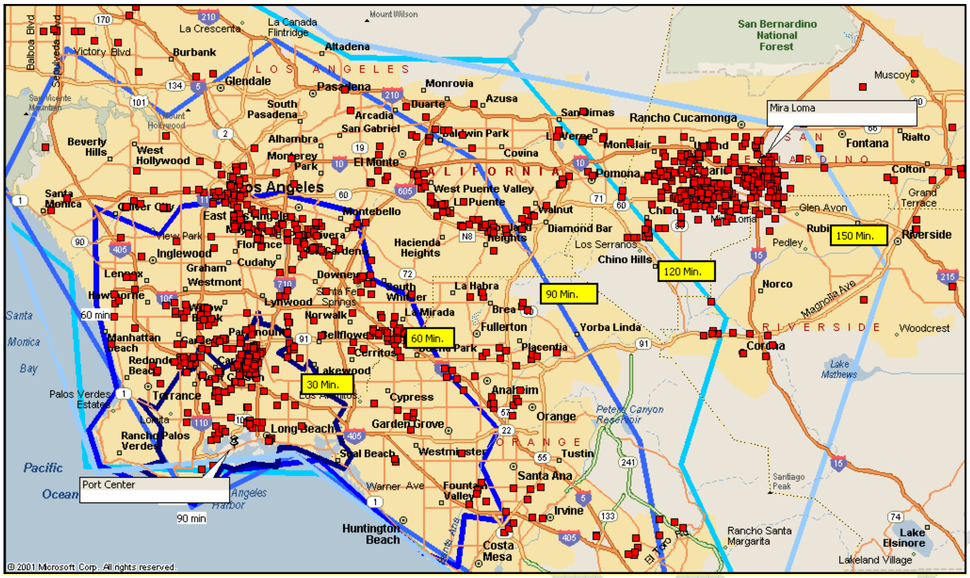


Exhibit 14 provides a preliminary estimate[2] of drayage time and distance between selected locations and Mira Loma (defined as the junction of I10 and I15) under those congested conditions.

Exhibit 14: Mira Loma Round-Trip Drayage - Preliminary

	Port Center		Colton		SBIA		SCLA	
Activity	**Minutes**	**VMT**	**Minutes**	**VMT**	**Minutes**	**VMT**	**Minutes**	**VMT**
Terminal Pickup	30	1	15	1	15	1	15	1
Outbound Driving	140	56.5	13	10.6	23	18.4	50	44.3
Container Drop/Pick	30	1	30	1	30	1	30	1
Inbound Driving	140	56.5	13	10.6	23	18.4	50	44.3
Terminal Return	30	1	15	1	15	1	15	1
Round Trip Total	**370**	**116**	**86**	**24.2**	**106**	**39.8**	**160**	**91.6**
Time savings			**284**		**264**		**210**	
VMT Savings				**91.8**		**76.2**		**24.4**

[2] Drayage operating and cost estimates will be refined in later project tasks.

"Port Center" (defined as the junction of the Terminal Island Freeway and West Ocean Blvd. on Terminal Island) is about halfway between the two ports. The round trip drayage move between there and Mira Loma would require a little more than 6 hours and cover 116 miles.

Colton (defined as the intersection of Riverside Ave. and East Slover) has been mentioned as a possible site for a demonstration inland facility. The round trip drayage move between there and Mira Loma would require about 86 minutes and cover 24.2 miles. About 30 minutes of the time savings is due to the faster truck turns (15 minutes) assumed for an inland facility, versus 30 minutes at a marine terminal.

San Bernardino International Airport (SBIA) was one site previously considered for a new BNSF terminal in the Inland Empire. The round trip drayage move between there and Mira Loma would require about 106 minutes and cover 39.8 miles. Here too, about 30 minutes of the time savings is due to the faster truck turns (15 minutes) assumed for an inland facility, versus 30 minutes at a marine terminal. VMT savings would be 76.2 miles per trip.

The Southern California Logistics Airport (SCLA) at Adelanto near Victorville has also been promoted as an inland port site. The round trip drayage move between there and Mira Loma would require about two hours forty minutes and cover 91.6 miles. Again, about 30 minutes of the time savings is due to the faster truck turns (15 minutes) assumed for an inland facility, versus 30 minutes at a marine terminal. VMT savings a would be 24.4 miles per trip.

These are by no means all the possible inland port locations or trips, but these examples do serve to illustrate the potential VMT savings and associated tradeoffs.

Exhibit 15 shows a preliminary analyses of the rail-truck tradeoffs involved in serving the Mira Loma area from three examples of possible inland port locations, assuming that all rail moves originate on-dock.

Exhibit 15: Preliminary Analysis of Rail-Truck Tradeoffs

	Inland Port Location Example		
	Colton	**SBIA**	**SCLA**
Approx. One-way Rail Miles from Port	91	83	113
Approx. RT Rail Miles	182	166	226
Est. Locomotives per train	2	2	3
Est. Locomotive Miles per Train	364	332	678
Est. Rail Switching Miles Per Train	10	10	10
Est. Total Locomotive Miles per Train	**374**	**342**	**688**
VMT Savings Per Truck Trip	91.8	76.2	24.4
VMT Savings: 50-Container trains	4,590	3,810	1,220
VMT Saved per Locomotive Mile	**12**	**11**	**2**
VMT Savings: 100-Container Trains	9,180	7,620	2,440
VMT Saved per Locomotive Mile	**25**	**22**	**4**
VMT Savings: 200-Container Trains	18,360	15,240	4,880
VMT Saved per Locomotive Mile	**49**	**45**	**7**

- The sites nearer to Mira Loma (Colton and SBIA) offer a more favorable ratio of truck VMT saved per locomotive mile required, as should be expected.
- The SCLA site shows a much lower ratio of VMT saved per locomotive mile for three reasons:
  - Longer truck trips between Adelanto and Mira Loma
  - Longer rail trips between the Ports and SCLA.
  - Additional locomotive power required to climb Cajon Pass.
- Adding drayage trips between marine terminals and a central departure point for a rail shuttle would reduce the advantages.

This very rough and preliminary analysis suggests that there is a real potential for VMT and emissions reductions if a nearby inland port serving the Inland Empire passes more detailed economic, commercial, and operational tests. The scale advantages of rail service are also evident, as the longer train lengths divert more truck trips in each movement.[3]

While the SCLA site does not initially appear well-suited to reduce VMT for trips between the ports and Mira Loma, the comparison would obviously be different for trips between the ports and Victorville, or for inbound intermodal movements from other regions.

[3] Train lengths and locomotive requirements will receive more detailed analysis in later study tasks.

Directing Economic Development

Case studies of inland ports suggest that successful developments in appropriate locations can have a powerful influence on the pattern of economic development. The SCAG region is both the beneficiary and the victim of robust economic development, making the location and pattern of that development a chief concern to local and regional planning agencies.

The ability of logistics-based development to act a magnet for the more transportation-dependent businesses implies that inland ports and logistics ports could be tools to influence the future development patterns at infill sites in the Inland Empire and elsewhere, but even more so in undeveloped areas such as the Victor Valley.

Exhibit 16 lays out the relationship between conventional economic development programs, logistics-based developments, and inland ports. The table is cumulative from left to right: logistics-based developments have all the issues and tools of general economic development, plus their own more specific items. Inland ports also have all the considerations of general economic development and logistics-based development

Exhibit 16: Economic Development and Inland Ports

Economic Development	Logistics-based Development	Inland Ports
Goal: Attract beneficial businesses and organizations to the region. **Message:** The region is an attractive, low-cost, and high-yield place to do business.	**Goal:** Attract logistics-based businesses. **Message:** The region/site offers specific logistical advantages (beyond its general business advantages).	**Goal:** Attract trade-based businesses. **Message:** The region/site offers specific advantages for handling international trade (beyond its general business and logistical advantages).
Anchor Tenants: Any business, but often manufacturers.	**Anchor Tenants:** Distribution centers, carrier facilities.	**Anchor Tenants:** Carriers, Customs, FTZ, transloaders.
Issues & Tools • Location assistance • Zoning & Permitting • Telecom & Utilities • Basic roads • Tax Incentives • Labor pool • Marketing assistance • Financial incentives • Cost of doing business • Local business climate	**Issues & Tools** • Freight transportation infrastructure (truck, rail, air, water) • Location on trade lanes & corridors • Role in supply chains • Freight carrier participation • Regional & national market access • Cost of logistics • Local receptivity to freight & logistics	**Issues & Tools** • Customs functions • Port of Entry status • Foreign Trade Zone • Security • Location on trade lanes • Distance to border • Cost of trade movements • Local receptivity to trade

Conventional Economic Development

The mission of most economic development and planning agencies is expressed in terms of regional competitiveness, jobs, well being, etc. Here are typical examples of economic development mission statements.

- SCAG: *Leadership, vision and progress, which promote economic growth, personal well-being, and livable communities for all Southern Californians.*
- Mid-Ohio Regional Planning Commission: *To enhance the quality of life and competitive advantages of the region by working through local governments and other constituents.*
- Kansas City Port Authority: *To enhance the economic vitality of Kansas City, Mo., through transportation, trade, commerce, and riverfront development within the statutory authority granted by the State of Missouri and the City of Kansas City.*

Economic development agencies ordinarily try to attract all kinds of beneficial businesses and organizations. Their major roles are promotion and facilitation. The promotion is carried out through advertising, liaison with developers, brochures, informational campaigns, etc. Facilitation commonly covers site selection, tax incentives, zoning, permits, utilities, and other "check-list" requirements for any kind of business. Economic development agencies basically try to sell the city or region as a low-cost, high-yield, and attractive place to do business. The core of their approach is the same whether they are trying to attract a major international manufacturer or a small entrepreneurial start-up.

Economic development agencies will address transportation issues but tend to emphasize passenger transportation and access to regional markets. Economic development agencies use a wide range of regulatory and financial tools, as shown in Exhibit 16. Most states have trade promotion functions, usually within the State Department of Commerce. These efforts are intended to attract importers and exporters and to promote exports from businesses in the state. These efforts can employ some of the same tools as economic development – advertising, tax incentives, technical assistance – but they are rarely site-specific and do not ordinarily deal with freight and trade infrastructure.

Logistics-based Development

One of SCAG's applicable objectives is:

> *Developing long-range regional plans and strategies that provide for efficient movement of people, goods and information; enhance economic growth and international trade; and improve the environment and quality of life.*

DCs used to be located to serve a given local or regional market at the least cost, usually by locating them at or near the center of the market. A category of DCs is emerging, however, intended for forward distribution of transloaded or sorted goods to more distant points in a corridor. The two Wal-Mart DCs at Joliet (see Appendix) are reportedly intended primarily to receive import loads from the West Coast and distribute sorted goods to points Chicago and east. By focusing on the *freight transportation and logistics* advantages of a candidate site, logistics-based developers bring additional tools and leverage to bear on location decisions. The Alliance Texas development discussed as one of the case studies in the Appendix is the earliest and best-known logistics-based development.

Inland Ports

On the spectrum in Exhibit 16, inland ports take the concept of logistics-based development one step further. By conceptualizing an inland location as a "port", with all the ancillary port facilities and services that can be translated inland, this approach focuses on trade-based businesses for which conventional economic development and logistics-based development may not be enough. An inland port will not thrive in a poor economic location or with poor logistics, so the other two functions are still necessary. The presence of Customs and FTZ services can be regarded as thresholds for an inland port. Inland port initiatives should also be contrasted with efforts to attract individual importers and exporters. Locating an individual importer or exporter does not ordinarily require establishing Customs functions (as those are performed at the actual seaport or elsewhere), nor does it require establishing a broad-based logistics infrastructure. Both logistics parks and inland ports would be tools for attracting importers and exporters, but most such location decisions are made on a company-by-company basis.

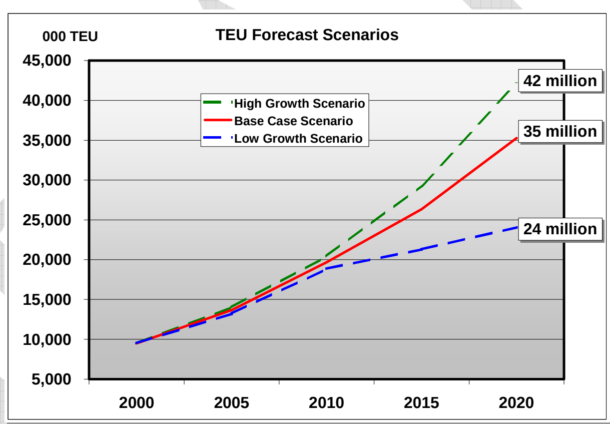
Some authors have perhaps cast the "inland port" net too widely, defining "inland port" to include major clusters of distribution centers and logistics businesses such as the whole Inland Empire, even though there is no uniting initiative or planning effort, no Customs functions, little or no interaction between the facilities, and no emphasis on international trade. Defining the term "inland port" so loosely can be confusing and does not help us create an inland port identity or strategy for Southern California.

Increasing Port Throughput

If a rail shuttle/inland port combination can provide a more efficient way to move container between the ports and regional customers, perhaps the system can also improve total port throughout.

Long-term cargo growth expectations (Exhibit 17) have put pressure on San Pedro Bay port facilities.

Exhibit 17: Long-term Port Container Cargo Forecasts[4]



- Terminals are becoming space-constrained.
- Highway congestion and gate queues are increasing.
- Empty containers are clogging terminals.
- Chassis logistics consume time and space.

These conditions are prevalent, in varying degree, at all West Coast ports. Existing terminals are primarily wheeled operations (containers parked on chassis) wherever possible, with empty containers and excess chassis stored on-dock. Where land is readily available and relatively inexpensive, this is a low-cost, high-performance system. As land become scarce and expensive, terminals will eventually have to shift to systems that use land more productively to handle the volume and accept the higher operating cost and increased complexity. (Exhibit 18)

[4] These figure swill be replaced by new forecasts now under development for the ports.

Exhibit 18: Container Terminal Operating System Progression

	Terminal System	Gate System	Chassis System	Empty Storage	Rail Transfer
Past	Wheeled	Manual, paper	Individual lines	On-dock	Off-dock
Present	Mostly wheeled, some stacked	Manual, paper & computer	Individual lines, some pooling	Mostly on-dock, some depots	Half on-dock, half off-dock
Transition	Mostly stacked, some wheeled	Semi-automated& paper	Steamship line chassis pools	Mostly depots, some on-dock	Mostly on-dock
Long-term	Stacked	Automated	Customer or trucker chassis	Off-dock depots	Primarily on-dock

In the peak season of 2004, congestion in the Southern California ports made world headlines and sent ocean carriers and customers searching for alternatives. That congestion was due to multiple factors, including the inability of rail connections to move all the cargo being tendered as quickly as required and the inability of the marine terminals to move containers through the port and accommodate more ships. The 2005 peak season passed without serious congestion problems, but the issue of port network capacity and throughout remains.

The potential to increase port throughput in an inland port development lies in the possibility of reducing on-terminal container dwell time. Container yard capacity and fluidity is the major factor in overall throughout capability, so a given reduction in average container dwell time translates almost directly into a comparable increase in terminal capacity. There are two avenues to be explored:

- **Reductions in dwell for on-dock rail shuttle containers that would otherwise have been drayed.** At present, there are some indications that on-dock rail containers may have *longer* average dwell times that trucked containers, presenting a challenge for new rail operations. The analysis will have to encompass import loads, export loads, and empties, since the three groups have dramatically different dwell time issues.

- **Reductions in dwell through application of agile port concepts**. As Chapter VI discusses in more detail, the objective of the various agile port ideas is to significantly decrease vessel turn time container dwell time through applications of operations and information technology.

Rationalizing Port-Area Land Use

Existing marine terminals are primarily “wheeled” operations (containers parked on chassis) wherever possible, with empty containers and excess chassis stored on-dock. As land becomes scarce and expensive, terminals will eventually have to shift non-essential functions off terminal, potentially to inland locations.

Ports have always been more than simply locations where ships were loaded and unloaded. The commerce passing through seaports attracts a wide variety of warehousing, processing facilities, and ancillary services. Exhibit 19 shows the locations of over 200 intermodal trucking firms and 10 container depots extending over 20 miles inland from the Ports of Long Beach and Los Angeles. This diagram does not include many other kinds of port-related businesses or airport-related businesses.

Exhibit 19: LA/LB Port-related Businesses

The expanded “inland port” concept (Exhibit 2) incorporates the idea that some port facilities could be duplicated or complemented at inland locations, thus promoting economic development and logistics integration inland while reducing the demands on scarce space at the seaport. The concept is intuitively attractive as port-area land values have risen, and warehousing and distribution facilities have sprung up in Southern California’s Inland Empire and other areas increasingly distant from the seaports.

For the first 30 years of containerization marine terminals tended to include ancillary non-revenue functions, such as container storage, cleaning, preparation, maintenance, and repair. In the last 20 years, however, such functions have been increasingly shifted to off-terminal locations for cost and capacity reasons.

- The former “50 mile rule” required all cargo and container handling functions to use longshore labor. When that rule was relaxed, shipping lines began relocating and outsourcing ancillary functions to avoid the high cost of longshore labor.

- The physical expansion of marine container terminals slowed while cargo volumes continued to grow, placing a premium on terminal space. Non-revenue functions and other activities that did not require water for vessel access were increasingly shifted off-terminal.

In most areas ancillary operational functions remain clustered near the port to minimize total cost, to facilitate container logistics, or out of simple inertia. Locational decisions for these functions incorporate the same factors as other commercial location choices. From a commercial cost perspective there may be opportunities to reduce total cost or increase capacity by relocating to lower-cost property. From a public policy perspective there may be opportunities to rationalize land uses in the vicinity of the ports.

The potential for inland location will vary with the details of the operation. Depots for refrigerated container maintenance and preparation might remain close to the seaport because of the multiple trips between the "reefer" depots and the marine terminals themselves. Ordinary container depots for storage, maintenance, and repair of dry containers can often be relocated inland as land uses and economics dictate.

Summary Inland Port Purposes and Benefits

From the preceding discussion it appears that an inland port following one or more of the models established elsewhere could serve the following purposes in the SCAG Region.

- **Freight Traffic Congestion Reduction.** By diverting port-related truck trips to rail (or, conceivably, another non-highway technology), the development and operation of an inland port could reduce the net truck VMT required to transport future cargo volumes between the ports and regional destinations. Most specifically, an inland port has the potential to reduce the truck congestion on I710 and other routes connecting the ports with inland locations. The amount of the reduction will depend on the volume of container trips that can be attracted, and the location of the inland port relative to the seaports and their customers. The reductions could be increased if the inland port can also accommodate domestic intermodal movements.

- **Emissions Reduction.** By diverting port-related truck trips to rail, the development and operation of an inland port could also reduce the net emissions (especially diesel particulate matter) associated with future freight flows. The net reduction will be a function of the line haul technology used between the seaports and the inland port as well as the net change in truck VMT. Emissions from terminal handling equipment will also have to be factored into the assessment.

- **Influencing Economic Development.** By encouraging efficient patterns of logistics-related business development in the vicinity, the presence of an inland port could assist in achieving long-term land use policy goals for inland areas. Encouraging freight traffic generators to group around intermodal hubs will increase overall system efficiency and mitigate the adverse impacts on adjacent land uses.

- **Increasing Port Capacity.** By reducing the dwell time of those import and export containers it handles, and inland port can increase the effective throughput capability of port facilities. Also, by providing and inland location for some ancillary port services, the inland port can make additional near-port land available for priority port needs.

In other regions inland ports and logistics parks are intended to expand the market reach of specific ports or facilitate new logistics-related development of the type already occurring in the Inland Empire. As the major challenge facing the SCAG Region is accommodating the economic and goods movement growth already anticipated, neither extending market reach or spurring even more development are considered appropriate inland port objectives for this study.

III. Inland Port Concepts

Review of the case studies presented in the Appendix reveals a wide variety of projects, facilities, and initiatives in the "inland port" field with varied relevance to SCAG's inland port goals. A set of proposed categories is presented below.

Satellite Marine Terminals

These facilities offer the key commercial and operational functions of a seaport at an inland location. Shippers, consignees, truckers, brokers, and other commercial entities interact with the satellite terminal just as they would with a marine terminal.

- Import containers are released from steamship line/stevedore custody to customers or their representatives, with Customs clearance or forward movement in bond.
- Export containers are received from customers or their agents for steamship line booking.

In both cases the customer has no responsibility for movement between the satellite terminal and the seaport. All such movement is accomplished under the steamship bill of lading or equivalent.

The Virginia Inland Port (VIP) is the only North American satellite terminal of this kind, and is the pioneering inland port facility. No other North American "inland port" accepts or delivers containers under steamship bills of lading in the same fashion as a marine container terminal. VIP was not a congestion relief effort, an economic development initiative, or an effort to increase the terminal capacity at Norfolk. VIP may have eventually filled some of these functions, but VIP was begun as an effort by the Port of Norfolk to expand its market reach in competition with Baltimore.

Metroport Auckland, in New Zealand, is very similar in concept to VIP. Metroport is linked by rail to the Port of Tauranga, and helps the port balance its cargo and compete with the Port of Auckland. Metroport is linked to Tauranga by frequent rail shuttles.

There are no other known inland ports connected to a specific seaport, or operated by a "deepwater" port authority (some are operated by specialized inland port authorities or river port authorities).

All-Cargo Logistics Airports

Closure of military bases across the country has led to the establishment of several logistics-based industrial developments around former military airports. Examples described in the case studies appendix include Vatry, March, San Bernardino, Rickenbacker, Kelley, and the Southern California Logistics Airport (Victorville). In each case, promoters are attempting to attract tenants based on air cargo capabilities. SCAG's 2004 RTP also documents some of these same cases in Appendix D-6. Success of all-cargo airports has been mixed, for several reasons.

The air cargo field can be divided into three segments.

- **Air express and parcel.** The overnight express business was the building block for the development of FedEx, DHL, UPS Airborne, and other "integrated" air carriers providing door-to-door delivery of time-sensitive documents and small parcels. This segment of the industry has continued to grow rapidly and has been the beneficiary of the e-commerce boom. These carriers dominate the air cargo field in terms of both tonnage and number of flights.

- **"Heavy" Air Cargo.** True "all-cargo" air operations focused on moving commercial goods rather than documents and parcels are limited in scope. Before the development of integrated parcel and express carriers, "air freight" was identified with all-cargo aircraft operated by specialist firms such as Flying Tigers, Emery Air Freight, and Cargolux, and by a few passenger airlines that had freighters (Northwest being a prominent example). This business now overlaps with the express carriers who carry a wide range of shipment types and sizes.

- **"Belly Cargo".** A substantial part of all air cargo travels in the baggage or "belly" space on passenger flights. For many years belly cargo accounted for the majority of air cargo tonnage. As shown in Exhibit 20, however, this percentage varies widely by airport and now averages around 30% in Southern California. As the RTP Appendix notes, the availability of passenger flights and belly cargo capability can significantly increase the ability of an airport to offer more air cargo destinations and capacity, especially in the international market.

Exhibit 20: Dedicated and Belly Cargo Shares at Regional Airports

		1994 Tons	%	2000 Tons	%	2002 Tons	%
LAX	Dedicated	783,585	46%	1,173,947	60%	1,224,182	62%
	Belly	919,860	54%	782,631	40%	747,144	38%
ONT	Dedicated	353,317	93%	448,902	97%	538,069	98%
	Belly	26,593	7%	13,884	3%	9,391	2%
LGB	Dedicated	27,454	99%	51,483	99%	58,531	>99%
	Belly	277	1%	520	1%	75	<1%
BUR	Dedicated	24,801	80%	29,629	95%	40,815	95%
	Belly	6,200	20%	7,407	5%	2,274	5%
JWA	Dedicated	12,360	78%	13,770	76%	13,312	85%
	Belly	3,418	22%	4,349	24%	2,334	15%
PSP	Dedicated	0	0%	0	0%	0	0%
	Belly	297	100%	144	100%	82	100%
TOTAL	Dedicated	1,201,517	**59%**	1,717,731	**68%**	1,874,909	**71%**
	Belly	956,645	**41%**	808,461	**32%**	761,300	**29%**
	Combined	2,158,162		2,524,692		2,636,209	

Source: SCAG 2004 RTP, Appendix D-6

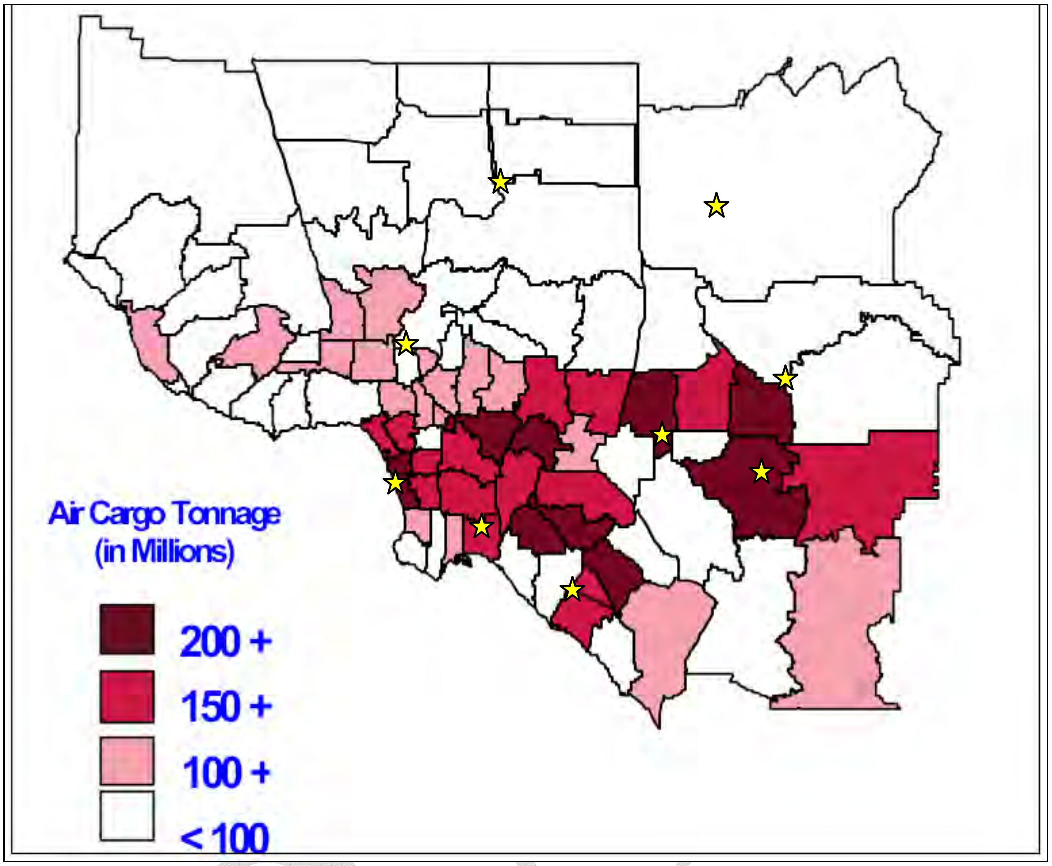
Developers of all-cargo airports hope to attract clusters of air cargo customers, what the RTP Appendix refers to as “catalytic demand”. Relatively few manufacturers and distributors have such a great reliance on air cargo that they would locate at an all-cargo airport unless that location also had good highway and market access. Classic examples of air-dependent firms include those dealing in high-value perishables (e.g. flowers, seafood). Many of the firms with such heavy air cargo or express needs are located at major existing air express hubs such as Memphis. Examples include distributors of computer parts (e.g. IBM or Dell). The RTP Appendix notes that the combination of ground and air access at March and San Bernardino has attracted major distribution centers for Kohl’s, Phillips Electronics, and Walgreens.

Study team review suggests that air-focused developments have been more successful in attracting tenants in the aircraft industry itself whose need for runway access is paramount (e.g. executive aircraft firms, aircraft maintenance firms, flight schools). SCLA, for example, has the following tenants:

- The Boeing Company
- General Electric
- Pratt & Whitney
- Leading Edge Aviation Services
- Southern California Aviation
- Victorville Aerospace
- Mercy Air Services

Almost all of the all-cargo airport projects are at former military bases. Military bases, however, were most often built away from major cities and isolated from major cargo markets. Two exceptions to the pattern of military base closures have been successes. The Huntsville airport is a former general aviation facility. The Alliance Texas Logistics park has a purpose-built cargo airport as a key component, but it was also built around rail intermodal and auto service facilities. In both cases, the emergence of a local air cargo market base was critical to success. Exhibit 21 shows the approximate location of the major regional airports in relation to projected air cargo demand.

Exhibit 21: Projected 2025 Total Air Cargo Demand



Source: SCAG 2004 RTP, Appendix D-6

Multi-Modal Logistics Parks

Multi-modal logistics parks such as Alliance Texas, Joliet Arsenal, and Huntsville have been the most successful “inland ports” at attracting economic development. Location is a major factor in their success: Alliance is just north of Ft. Worth along a major trade corridor, Joliet is just west of Chicago, and Huntsville waited 30 years for its location to eventually develop. In the Alliance and Joliet cases, the master developers had a major role in their success.

A critical distinction is that logistics-based advantages can complement and strengthen the basic attractions of a city, region, or site, but cannot override poor location. This distinction is evident in some of the case studies, notably in the Neomodal and Global TransPark developments that have so far failed to attach the expected volume of business or development. Logistics-based development is much more likely to succeed with the involvement of a specialized master developer such as CenterPoint Properties (Joliet) or the Hillwood Group (Alliance Texas, Alliance California). Another key factor in successful logistics development is willing long-term commitments from the railroads, air cargo operators, or other carriers. The difference between logistics-based development and market-based development is illustrated by the emergence of trade and transportation corridors as distribution center (DC) candidates.

Rail Intermodal Developments

Examples of "inland ports" built around rail intermodal terminals without air or other modes (except truck, which is ubiquitous) include Quincy, Port of Montana, and Neomodal. Rail intermodal service was one of several key elements in the Alliance development. The Shafter, California proposal is also based on a proposed intermodal terminal. Rail intermodal terminals have strong economies of scale. Railroads, therefore, are highly selective about the markets in which they locate terminals, and they usually have only one terminal in a relatively large market. Rail intermodal service also has strong scale economies, and railroads may not be willing to extend service to speculative developments.

While many different industries use rail intermodal service to some degree, virtually none of them do so as direct railroad customers. The actual railroad intermodal customers are truckload motor carriers, (e.g. Schneider National, JB Hunt, Swift), LTL motor carriers (e.g. UPS, Roadway), intermodal marketing companies (IMCs, e.g. Hub City Alliance), and the international steamship lines.

The most successful rail intermodal-based developments start with an intermodal facility serving an existing market rather than having the scale economies of intermodal operations dependent on future development success. Serving an existing market avoids the classic "chicken and egg" situation in which competitive intermodal service requires a minimum volume and the minimum volume requires competitive service. Alliance Texas is also example of a successful rail intermodal approach. The core BNSF facility was built as a replacement for a previous facility serving the Dallas-Ft. Worth market. The Alliance terminal could therefore operate on an efficient scale and offer competitive service options and frequency from the beginning. The proposed Shafter development faces the chicken-and-egg problem; there is little or no existing customer base or demand to justify a terminal there, and such demand is unlikely to emerge without either terminal or service.

Trade-processing Centers

The Kingman, Yuma, and Richards-Gebaur initiatives base a large part of their strategy on relocating various "trade-processing" activities from congested and costly border gateways to inland points. A key issue for these initiatives is the definition of "trade processing" and their ability to define and market a value proposition.

Given a broad commercial goal of moving imports and exports as quickly and economically as possible, "trade processing' functions would generally be regarded as sources of cost and delay to be avoided or minimized. In an important sense, trade prefers not to be processed.

Unavoidable trade processing steps are primarily related to Customs and other government regulatory and security functions. For most containerized cargo Customs clearance is accomplished electronically through the CBP Automated Manifest System (AMS), with no physical cargo or container contact. There is no relationship between the AMS data entry and cargo location. A significant part of the carrier and NVOCC data entry and processing is actually outsourced to foreign companies. For the great majority of containerized cargo, therefore, there are no "trade processing" functions that could be relocated inland from the seaport.

Networks, Corridors, and Shuttle Services

The case studies also discuss three network and corridor projects: the Port Authority of New York and New Jersey, Port Inland Distribution Network (PIDN), the Heartland Corridor, and the North American Inland Ports Network. The growing use of the corridor concepts is evident in the CANAMEX and River of Trade Corridors. None of these projects are "inland ports", but they attempt to link and network inland ports and seaports in various ways.

There have been a handful of rail and barge shuttles operated between seaports and inland ports. Success has been mixed. One prominent demonstration project, the barge service between the Port of New York/New Jersey and Albany, New York has recently been discontinued.

Economic Development Initiatives

The KC SmartPort program is an economic development initiative, not an inland port at a fixed site. As such, the SmartPort program illustrates the potential economic development value of logistics-based and inland port approaches without being tied to the features of any one facility.

IV. Inland Port and Rail Shuttle Issues

Railroad Participation and Capacity Requirements

The willing participation of either or both railroads is a prerequisite for development of an inland port and rail shuttle. Plans for rail participation in either start-up or long-term operations must encompass rail operating, pricing, and equipment options, and, most importantly, capacity.

Capacity will be the primary issue in railroad participation, not cost. Long-term railroad participation in a short-haul rail shuttle will be contingent on public funding for increased capacity. The situation is parallel to that of passenger rail services in California, whose expansion has been facilitated by strategic state investments in additional track capacity, signaling, and other measures to expand total rail capacity.

Studies consistently indicate that unsubsidized short-haul rail shuttles in the 50-100 mile range will not be commercially viable or attractive business propositions for the railroads. It is equally clear that developing and operating intermodal facilities is unlikely to be a profitable stand-alone venture. Both will require subsidies or other forms of financial support to succeed in a competitive environment.

Both Class 1 railroads are experiencing traffic growth, driven by transcontinental intermodal movements that generate far more revenue than short-haul intermodal movements such as regional shuttle trips. An operating subsidy to make up the difference between commercial rail intermodal rates and the trucking competition will not be nearly enough to interest the railroads if they have to turn away higher-yield business due to capacity constraints.

Recent national discussions of public-private partnerships for freight have included the possibility of public investment in rail capacity in return for rail service and rate commitments on target movements. The scope for direct public investment in inland port and rail shuttle operations facilities has expanded since the inception of the inland concept as traffic growth has brought both BNSF and UP closer to their trackage and terminal capacity limits in both Northern and Southern California. A multi-jurisdictional or comprehensive public-private agreement for rail freight projects in California could have great advantages to both parties and facilitate progress on many pending issues.

Inland Terminal Planning Factors

Physical Considerations

When a new terminal site must be developed, the site should be evaluated based on the following characteristics:

- **Proper Size.** The terminal must be sized appropriately to handle the anticipated customers and volume. Intermodal terminals can exceed 300 acres. The requirement to economically assemble large parcels of land for new intermodal terminals severely limits the number of available site options, particularly in highly developed metropolitan areas.

- **Proper Shape.** The ideal site is very long (for large terminals, more than a mile in length), relatively narrow, and parallel to the railroad's main line. This parallel orientation permits an efficient facility design that minimizes operating costs. The length of the facility is driven by the expected volume and train sizes, while its width is driven primarily by trailer and container storage requirements.

- **Low-Cost Development.** The cost of developing terminal capacity varies dramatically. There are no returns or profits associated with intermodal terminal land ownership. Terminal contractors make their money from providing lifts, and the railroads make their money by providing train service.

- **Expandability.** Experience indicates that demand for terminal capacity will grow significantly over the anticipated life of a successful facility. Therefore, the availability of additional land nearby for development, to support future growth, is highly desirable.

- **Highway Access.** Efficient, uncongested highway access to customers is a critical element in site selection and will strongly influence the projected volume forecast for a proposed new terminal. Local drayage is relatively expensive, typically $40 to $60 per hour. Accordingly, available highway infrastructure and associated congestion levels define the market area that is practically available to the projected terminal. Road condition is also important, as heavy tractors, trailers, and containers will inflict damage on light-duty roads and will suffer damage on poorly maintained roads.

- **Rail Access.** New intermodal terminals are most often developed along existing intermodal railroad main lines, thereby avoiding capital requirements to develop additional railroad main lines. Access should also be complementary to existing or emerging local operating patterns.

- **Local Community Considerations.** The attitude of the local community and various associated government agencies is a very important consideration for an intermodal terminal. Where attitudes are cooperative and supportive, the new site can often be easily developed and the related public infrastructure can be improved to expedite access to the terminal. Where there is community opposition the process may proceed, but at much greater cost both in terms of time and money. Infill sites are often disadvantaged in this respect.

An ideal site for the development of a intermodal terminal has high quality access to both the railway and highway networks, is near a large cluster of customers, is big enough to support the expected volume and to allow for expansion, is inexpensive to develop, and is in a friendly community.

Planning Guidelines

Tioga has developed the following information as an aid for intermodal terminal planning at the preliminary, conceptual stage. The guidelines presented are based on industry norms and are general in nature. The fact that makes this kind of analysis reliable is that intermodal terminals in North America are similar enough that practical guidelines for development of new facilities can be determined by observation of existing operations. Practical exceptions abound, but can generally be understood in terms of unique, case specific factors that should be incorporated in planning as they are identified.

The guidelines have been used and refined over the past decade as The Tioga Group has performed capacity and benchmarking studies for Class I railroads and the AAR. The AAR published some of the results in 1993. An additional set of findings was published by the Eno Foundation in 1999.

- **Capacity Measure –** Production at intermodal terminals is most commonly measured in lifts. A lift is the transfer of a trailer or container from a rail car to the ground or from the ground to rail car. Secondary lifts are defined as lifts between the ground and a chassis and are not counted in the measures below.

- **Lifts Per Acre –** The general guideline is 2000 annual lifts per acre. One caution is necessary with this guideline. Terminal operators tend to be very inconsistent in the manner in which they measure and report terminal acreage. A facility planned at 2000 lifts per acre should be able to incorporate common intermodal functions including car storage. The land does not need to be a regularly shaped parcel. 2000 lifts per acre is a relatively conservative guideline and particularly well-operated and well-designed facilities on regularly shaped parcels can do much better.

- **Loading Track Length –** This is the track that is accessible to sideloaders or cranes. The planning factor that is recommended is 1500 annual lifts per 100 ft of track. The guideline implies that there will be regular resets of the loading tracks, particularly on busy days. Most facilities do not achieve this level of use and have surplus capacity. Those that exceed this level of use, typically do so at a service penalty. Facilities that successfully exceed this level typically service a relatively large number of trains throughout the day.

- **Rail Car Storage Requirement –** The terminal must have enough track to buffer the operation and the imbalances imposed by the weekly operating cycle. In some locations this means track lengths 2.5 times the loading track length.

- **Parking Requirement –** The range for this guideline is relatively wide 100-300 annual lifts per trailer parking spot. In making a planning estimate a judgment must be made regarding the operation and character of the traffic. International traffic tends to move much more slowly than domestic. Also some terminals are designed to offer container yard services for international shippers; this guideline does not apply in that case and any land reserved for long-term storage purposes should not be considered as available for general use by the terminal. Parking space accounts for most of a terminal's footprint and is often the limiting factor in terminal capacity.

- **Gate Transactions Per Lift –** The planning assumption is 1.5 per lift. Theoretically this number could be as low as one gate move per lift or as high as four. Exceptions might include terminals that are performing car-to-car transfers and facilities that are also serving as container yards. Clearly one move per lift is much more efficient than four and the draymen will be working to produce the most efficient case.

Operational Cycles

There are common operational cycles implied in these relationships as follows:

- **Daily Cycle –** Terminals typically strive to match shipper practices. For most facilities this means handling inbound trains in the morning and outbound traffic in the afternoon or evening.

- **Weekly Cycle –** Most customers ship five or six days per week. This means that intermodal terminals handle most outbound traffic Monday through Friday; a small minority is handled Saturday and an even smaller portion of the outbound is handled Sunday. For an inland port the shipper cycle will be combined with the marine transportation schedules of the ships loading in the nearby ports. In Los Angeles and Long Beach much of this activity happens on the weekend. The combination of shippers being closed on the weekend and large volumes of import marine cargo being handled on the weekend implies that there will be a very large requirement to receive and unload cargo over the weekend that will not be dispatched by truck until Monday or Tuesday (when there is often a shortage of drivers).

- **Annual Cycle –** Generally, intermodal terminals have relatively small seasonal peaks in March and October and have a significant low period in late December and early January.

Inland Empire Intermodal Terminal Projects

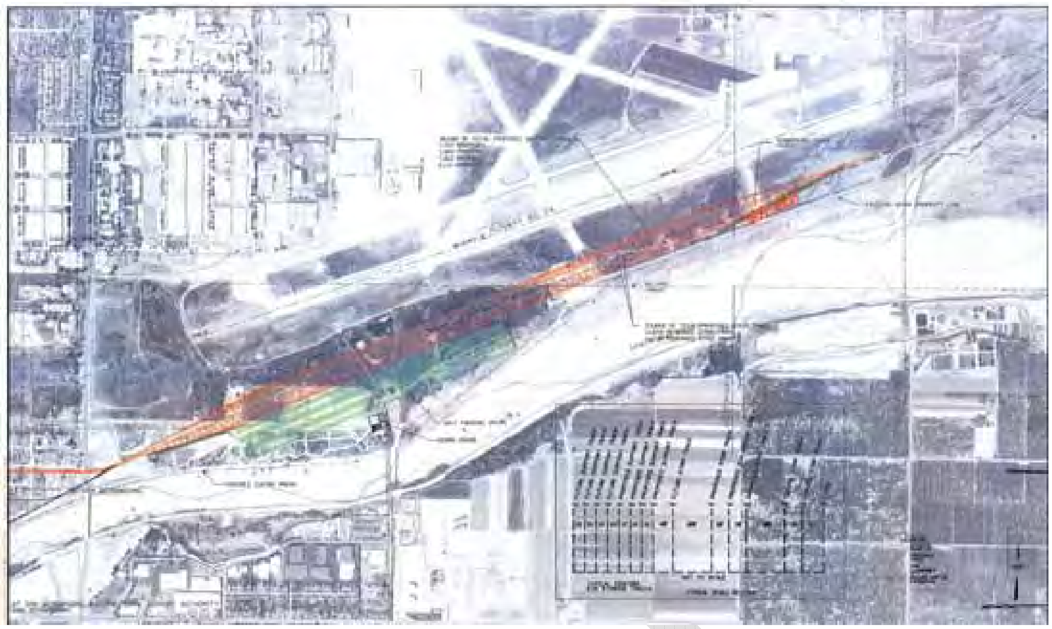
Expanding intermodal terminal capacity in an existing market is ordinarily not accomplished until there are obvious capacity-related operating problems and a clear justification for capital investment. Most often, additional terminal capacity is developed by expanding an existing terminal. Terminals are typically designed taking into account long-term development plans, and it is generally more efficient to fully exploit an existing site before developing new sites. This is certainly true considering the complexity of permitting and other regulatory processes. It is also very likely that an existing terminal is already in a commercially and operationally satisfactory location within the metropolitan area.

BNSF Railway has sought to develop a second intermodal terminal in the Inland Empire because its San Bernardino terminal is at capacity. Previous sites considered are discussed below.

San Bernardino Airport Site

Closure and reuse of Norton AFB as San Bernardino International Airport presented an opportunity to assemble a large enough parcel of land to build a new intermodal terminal (Exhibit 22). BNSF, SANBAG, and the City of San Bernardino cooperated in a series of traffic studies to determine the traffic impacts such a facility would have on the area.

Exhibit 22: Preliminary Intermodal Terminal Plans for Norton/SBIA Site

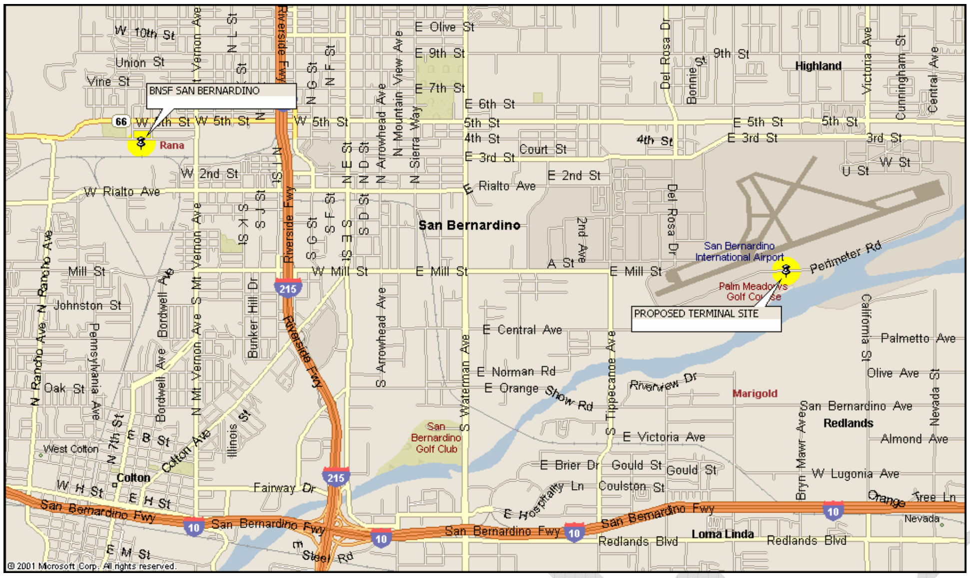


BNSF eventually elected not to pursue the project. The project faced typical barriers found in most large developments:

- Assembly of parcels from multiple owners, and the timing related to assembly;
- Minor environmental concerns with on-site species impacts; and
- Capital and operating costs.

The disruption of running trains through downtown San Bernardino to connect the existing BNSF facilities with a new terminal at Norton (Exhibit 23) turned out to be the most difficult and decisive barrier to the project. While the assembly, cost, and environmental problems might have been manageable, the difficulty of creating an acceptable, efficient rail connection across developed areas of San Bernardino was considered impractical to mitigate.

Exhibit 23: BNSF Norton/SBIA Site Access



This access problem highlights the difficulty of creating new intermodal facilities in developed urban areas. This instance is a specific example of the larger problem facing the SCAG region, and all urban areas: the industrial and population growth that creates the demand for freight transportation simultaneously creates barriers to meeting that demand.

Note that by locating adjacent to SBIA, such a new BNSF facility would have created a multi-modal development.

Devore Site

Consideration was been given to potential intermodal terminal sites along the rail corridor between San Bernardino and Cajon Pass, specifically at Devore (Exhibit 24). One site that was investigated is a privately held parcel west of I-215. As shown in the aerial photo, however, the parcel is constrained by geography, wedged between the hillsides and the floodplain. Analysis by BNSF concluded that an efficient intermodal terminal on the site was not feasible for two reasons.

- Site configuration would force much of the available land to be devoted to approach trackage, reducing the potential terminal space.
- The prevalent grades of 2.2% on adjacent trackage would raise serious operating, cost, and congestion issues.

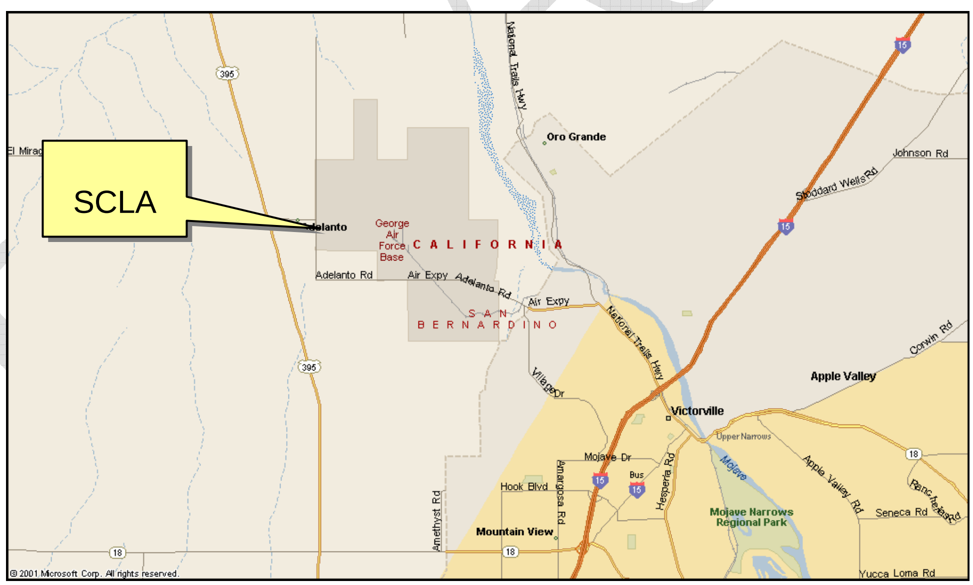
Accordingly, the site is considered impractical as an intermodal terminal.

Exhibit 24: Proposed Devore Terminal Area

Southern California Logistics Airport Site (Victorville)

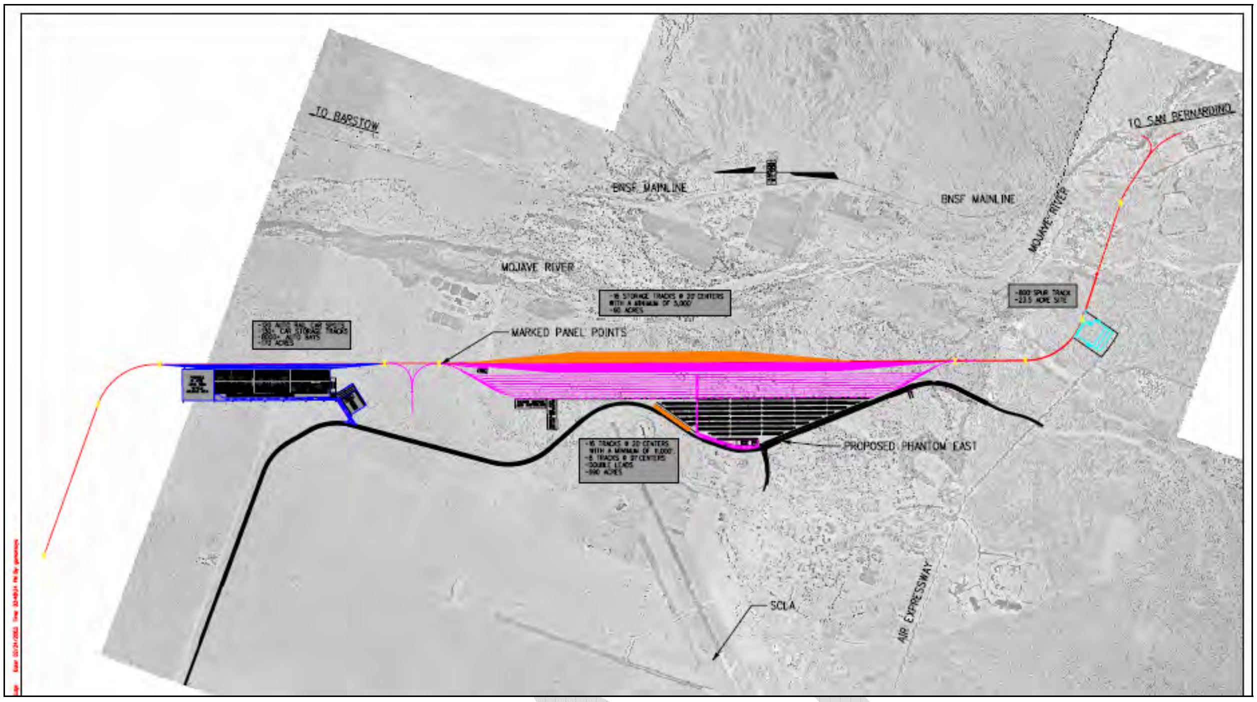
Conceptual plans for the Southern California Logistics Airport (SCLA) near Victorville (Exhibit 25) have always included the possibility of a rail intermodal terminal.

Exhibit 25: SCLA Site



BNSF has investigated the location and has worked with SCLA to suggest conceptual plans to SCLA (Exhibit 26) that differ from the original conceptual plans shown in many SCLA publications.

Exhibit 26: Preliminary Intermodal Terminal Plans for SCLA Site



The Victorville area is a less-than-optimal choice as a rail intermodal terminal for BNSF as it is much farther from the Inland Empire intermodal customer base than the existing San Bernardino terminal.

The major issue with the SCLA site as a near-term “inland port” site is, likewise, its location. Lying north of Cajon Pass, SCLA is not an efficient hub site for trucking to and from Inland Empire port customers. The SCLA site is only 3 miles closer to the Mira Loma area than is the Port of Long Beach, so any VMT savings would be minimal, and would also be offset by the difficulty and cost of trucking up and down Cajon Pass. Any rail shuttle to and from the ports would likewise have to operate over Cajon Pass, a congested and high-cost route.

In the long term, as the Victor Valley area develops into a separate market, the SCLA site may become more attractive. As noted above, serving a *developed* area with new intermodal facilities sis inherently difficult. Serving a *developing* area such as Victorville allows the customer base to grow up around the facility.

Inland Empire Planning Cases

Tioga considered three planning cases for an inland port rail intermodal terminal based on volumes of thirty, sixty, and one hundred twenty thousand annual lifts. The planning factors above drive the following very preliminary requirements. (Exhibit 27)

Exhibit 27: Sample Intermodal Terminal Planning Cases

Planning Factor	Small	Medium	Large
Annual Lifts	30,000	60,000	120,000
Minimum Acreage	15	30	60
Loading Track Length	2,000	4,000	8,000
Storage Track Length	5,000	10,000	20,000
Parking Slots	300	600	1200
Annual Gate Volume	45000	90000	180000
Estimated Cost	$3.0-$ 7.5 Million	$6.0-$15 Million	$12-$30 Million

In addition to the facilities required, terminal equipment would be required. The number of machines is dependant upon the number of primary and secondary lifts to be provided as well as the schedule of both trains and the gates.

Exhibit 27 also has implications for site selection, as the minimal size shown for a large facility is 60 acres. The track length of 8000 feet implies the need for a long, narrow site.

Roles and Responsibilities

The following roles and responsibilities are crucial for the successful development of an inland port via rail intermodal service. These functions are all required to provide the necessary railway, highway, vehicle, and terminal assets necessary to establish intermodal freight transportation services.

- **Real estate.** The entity that owns the land on which the intermodal terminal is developed.
- **Terminal improvements.** The entities that make the capital investment in the highway and rail infrastructure improvements necessary to provide efficient access to the site, and on-site improvements that provide the necessary terminal infrastructure.
- **Financing.** The entities that will finance the various elements of the project.
- **Provide the terminal equipment.** The entity that provides the equipment necessary to operate the terminal. This may include lift machines, yard tractors, boilers, or any kind of specialized terminal equipment.
- **Line haul rail equipment.** The entity that provides the line haul equipment (railcars, trailers, etc.) to support the proposed services. Establishment of these new services may necessitate equipment owners to either invest in new equipment or redeploy existing equipment from less lucrative services or locations.
- **Operating systems.** The entity, usually the terminal contractor, that provides the information and operating systems required to ensure an efficient flow of data between the parties.

- **Terminal operations.** The entity that performs the day-to-day operation of the facility, usually a specialized contractor.
- **Railroad operations.** The entity that provides and operates the rail service. Ordinarily a major railroad but exceptions are possible and should be considered.
- **Marketing.** The entities that market the rail intermodal services.

As these and other responsibilities are assigned, the interrelationship between governance, operational control, and financing can be anticipated to become quite complex. For example the use of public money tends to increase development expenses, particularly those associated with the public process, and gives the public a greater say in the governance of the facility. This is a point resisted by most railroads, which typically desire full operational control, can be expected to be more efficient operators, and do not want to pay (or repay) for the public process. There are several similar issues to be resolved in the development of an effective public-private partnership in the development of an intermodal facility.

Rail Intermodal Terminal Services

Besides the basics of modal transfer, a rail intermodal terminal may provide additional services, either as a stand-alone facility or as part of an inland port. Some of the menu choices are shown in Exhibit 28 along with an estimate of their commonality. Obviously, the more services provided the greater the land requirement, capital cost, and operating cost.

Exhibit 29 lists additional services that might be provided within the terminal.

Exhibit 28: Menu of Rail Intermodal Terminal Services

Function	All	Most	Some
Modal Transfer (Lift)	✓		
Control Point—Trucks Check In/Out	✓		
Immediate storage for containers in loading process	✓		
Lift Equipment Servicing	✓		
Administrative Support	✓		
Rail Car Storage		✓	
Lift Equipment Maintenance		✓	
Running Repairs for Containers & Chassis		✓	
Rail Car Maintenance		✓	

Exhibit 29: Menu of Additional On-Terminal Services

Function	All	Most	Some
Loaded Container Storage		✓	
Locomotive Storage and Servicing		✓	
Long Term Container Storage			✓
Customs Inspection Facility			✓
Heavy Repair for Trailers, Containers, & Chassis			✓
Cross Dock Facility			✓
Warehouse Facility			✓
Motor Carrier Terminal on Site			✓

V. Additional Inland Port Functions

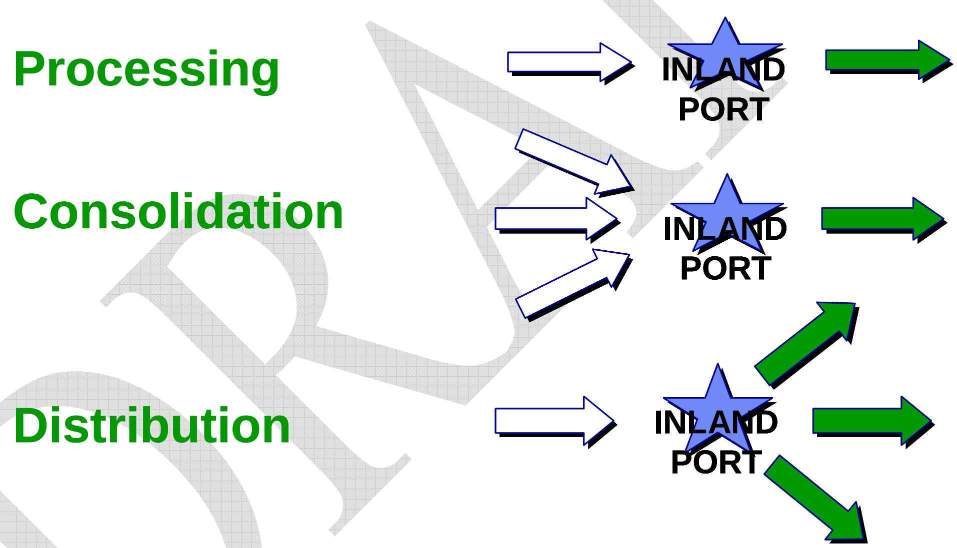
Overview

University of Texas studies have defined an inland port as a facility "located away from traditional coastal borders with the vision to facilitate and process international trade through strategic investments in multi-modal transportation assets and by promoting value-added services as goods move through the supply chain." As the case studies demonstrate, inland ports can take many forms and offer a varying range of services. This chapter describes functions that have been incorporated in inland ports and related projects.

Value-Added Functions

For an inland port or logistics park to prosper its facilities and tenants must be able to create value for their customers. To create value, either the facility itself or the tenants must ordinarily do one or more of three basic things shown in Exhibit 30.

Exhibit 30: Value-added Basics



Process the goods to increase their value. "Processing" in the broadest sense could include refining, sorting, packaging, testing, assembling, or any other operation that increases the value of the goods to the customer. Classic examples include milling grain into flour or packaging bulk goods for retail sale. Completion of regulatory requirements such as Customs clearance or agricultural inspection can, in some sense, be regarded as increasing the value of the goods by making them legal to sell, but the importers, carriers, and customers do not willingly pay for those types of "processing."

Consolidation. Consolidation is a second means of adding value. Consolidation can include:

- consolidation of multiple small shipments into a single, more efficient large shipment; or

- consolidation of multiple items into a single delivered product.

The first type of consolidation is typical of LTL trucking, air freight forwarding, export containers, freight stations, or outbound truck/rail transloading. The second type, also called "kitting" is typical of computer retailers (e.g. Dell) or retail packages of seasonal promotions (e.g. end-of-aisle Christmas card displays).

Distribution. Distribution in its simplest sense is the act of splitting large shipments into smaller shipments for local delivery. This simple sort of distribution is also called "deconsolidation". Typical examples include:

- wholesale-to-retail distribution centers (DCs);
- inbound rail/truck transloading for local delivery;
- inbound air freight forwarding;
- inbound LTL trucking; and
- import container freight stations.

Combinations. Most facilities host a combination of these basic value-added steps. For example:

- LTL truck terminals receive inbound consolidated loads from other hubs, deconsolidate them, resort them, and send them out as consolidated loads to be distributed along a local route. The process is reversed for outbound shipments.
- Retail chain distribution centers receive truckload lots from multiple vendors and create consolidated loads for individual stores. They also receive returned merchandise and shipping containers from individual stores and consolidate them for return to vendors.
- Import distribution centers receive consolidated container loads of merchandise. They sort the merchandise into new consolidated loads for regional DCs or stores, and often "process" imports by packaging and pricing.
- Air freight forwarders may function like LTL truck terminals but may also offer export crating or Customs brokerage services.

Adding value at inland ports. With these basic types of value creation as building blocks, it is possible to ask how different types of inland ports propose to add value. Most inland ports combine modal transfer (including consolidation/deconsolidation of trainload or planeloads) with providing facilities for processing/consolidation/deconsolidation by tenants. The modal transfer and consolidation/deconsolidation of shipments is analogous to a seaport handling vessels with multiple shipments, hence the "inland port" nomenclature. The business of providing land or facilities for processing/consolidation/deconsolidation by tenants is basically the same as industrial park development, with an emphasis on logistics rather than manufacturing.

The balance of this chapter considers a number of different possible ways in which value could be created in an inland port.

Cargo Handling Functions

Cargo-handling functions for containerized freight include consolidation, deconsolidation, and transloading. Historically, these functions were provided at a Container Freight Station (CFS) as part of a marine container terminal. These facilities were operated by longshore labor to serve less-than-containerload customers and as a transition between traditional break-bulk cargo handling and containerization. Container Freight Stations were relocated off-terminal for the same reasons as other ancillary functions: cost and capacity.

Consolidation, deconsolidation, and transloading facilities are now almost exclusively located off-terminal. There are several generic reasons why international cargo would pass through one of these facilities instead of moving as a single container shipment from door to door.

- **Less-than-containerload shipments.** Multiple small shipments with common origin and destination ports can be combined as a single containerload. This type of service is increasingly provided by NVOCCs, ocean freight forwarders, or 3PLs rather than by the container shipping line itself.

- **Specialized handling**. Some commodities require specialized handling that is not available at the point of origin. One example is cotton, which has typically been mechanically compressed at near-port facilities before being loaded into containers for export. Some cargo handling facilities have specialized in the complex blocking and bracing requirements for shipping machinery. Others are equipped to handle "super bags" of plastic pellets.

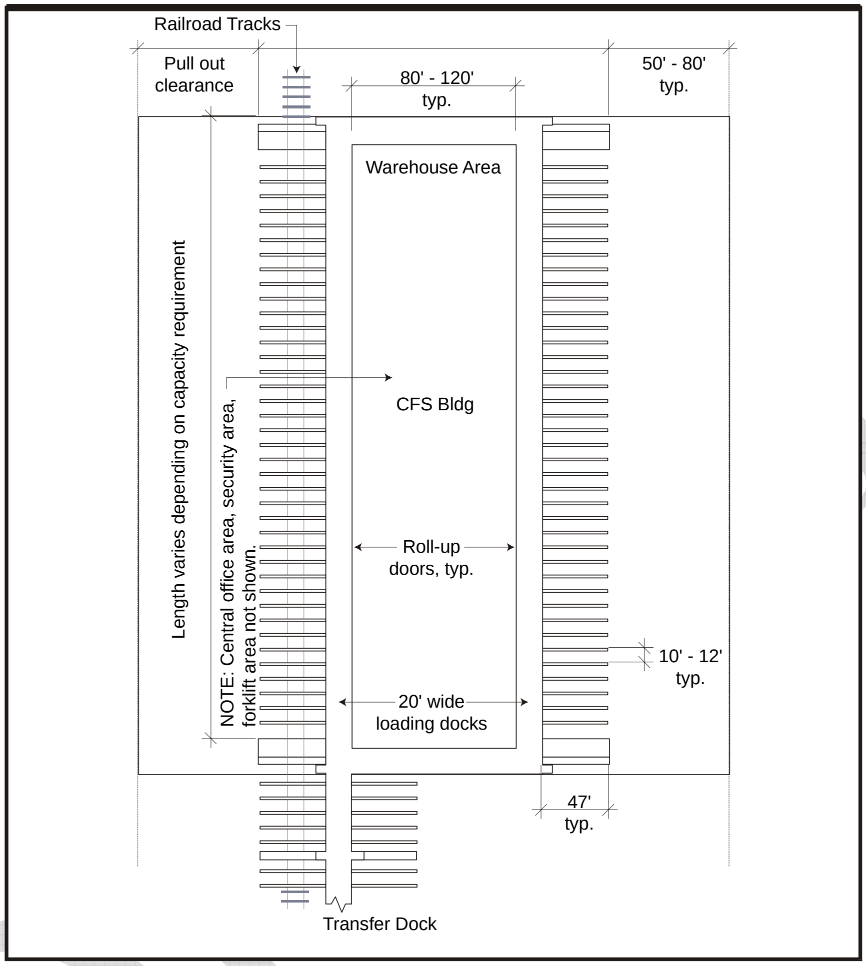
- **Refrigerated commodities.** Refrigerated ("reefer") containers are 10 – 20 times more expensive than dry containers, have significant maintenance requirements, and move empty back to origin more often than dry containers. Some ocean carriers avoid sending refrigerated containers inland, preferring to transload the cargo to domestic refrigerated equipment.

In practice, consolidation, deconsolidation, and transloading are so co-mingled with each other and with other handling functions as to make clear distinctions impossible. Current logistics practices integrate deconsolidation, transloading, sorting, and packaging functions in the same facilities as part of a carefully managed distribution network. The location and function of each node in the network is a company-by-company decision and tends to evolve over time to accommodate shifting company needs.

Transloading

"Transloading" is the practice of transferring cargo between international and domestic transportation equipment, typically to take advantage of the large cubic capacity of U.S. trucks. Until marine containers began moving inland efficiently by rail and truck, transloading was the norm. As a practice, transloading dwindled in favor of full-container shipments until the 1990s. A typical transloading facility configuration is shown in Exhibit 31. The floor space typically ranges from 40,000 to 200,000 square feet. There are several other varieties of cargo-handling services, and few of the operators have single-purpose facilities.

Exhibit 31: Typical Transloading Facility



International transloading facilities are the most numerous in Southern California due to the dominance of import trade. The reasons for such activities can include the following.

- For light and bulky articles, the goods can be transferred from an international 40-foot container to a 53-foot over-the-road domestic trailer or domestic container.
- The portion of the cargo for Los Angeles and west coast consumption can be unloaded, and locally produced goods can be mixed with those arriving from the Asia and/or Central and South America to create an eastbound domestic load.
- Final destinations, quantities and mixes of goods can be changed from the original intent and/or customized for a specific destination based on fresher, better market knowledge.
- Unsold goods can be held at the first port of arrival until their ultimate destination is determined.

Originally such facilities were located close to the ports in the Carson and Compton areas. However, today they are increasingly being located in the Inland Empire or even further into Southern California to mix import cargoes with Southern California domestic distribution.

Commercial Customs Functions

Customs Inspections. As has been widely documented only a small percentage of all import containers are opened or otherwise inspected by Customs and Border Protection (CBP). Containers are inspected for contraband (e.g. drugs), undeclared or mis-declared cargo (e.g. commodities banned, governed by quotas, or subject to higher duties than the declared contents), or stowaways. CBP relies primarily on the Automated Targeting System (ATS), which identifies shipments to be physically inspected based on origin, destination, commodity, shipper/consignee, and other factors. Containers declared to contain handicrafts from Columbia, for example, are much more likely targeted than auto parts from Japan.

Containerized cargo may be inspected via remote sensors, x-rays, cursory examination, or complete unloading for an item-by-item examination. Cargo is cleared for delivery or transport inland only after any necessary CBP inspections are complete.

In-bond transport. Imported goods must be "cleared" by Customs before the consignee can take possession. To be "cleared", the consignee or his agent (a Customs Broker) must complete electronic or paper forms, pay any applicable duties, and make the cargo available for inspection if required. If the only issue involving the cargo is payment of applicable duties, cargo owners or their agents (e.g. a Customs House Broker) may post a bond and transport the container "in bond" to an inland location pending Customs clearance. A large portion of the minilandbridge container traffic moves in bond, with Customs clearance completed before the container is released from the inland rail terminal. In this case, the cargo "enters" the U.S. in the inland Customs District where it was released. The "processing" function is minimal, and is frequently completed without CBP personnel on site.

Customs bonded warehouse. Once "bonded" a shipment can also be moved to a Customs Bonded Warehouse to await final clearance.

Security Functions

Security-related functions *cannot* be relocated inland from the seaports. Containers suspected of containing contraband, weapons, or stowaways cannot be transported inland for any reason without unacceptable security and safety risks. Thus, the increased port activity and investment related to cargo security will not directly benefit inland ports. There may, however, be an indirect benefit if security functions and capital investments squeeze out other functions that could be performed inland.

Foreign Trade Zones

A Foreign Trade Zone (FTZ), also known as a Free Trade Zone, is a federally sanctioned site where foreign and domestic goods are considered to be outside of the U.S. customs territory. Foreign Trade Zones operate at the intersection of regulatory and commercial interests. Cargo received into a Free Trade Zone has not technically entered the U.S. in a regulatory sense and is therefore not yet subject to duties, quotas, or other regulations. Importers can leave inventory in an FTZ (at some cost) until it is advantageous to actually receive it. Under carefully prescribed conditions, cargo can be packaged, combined or otherwise processed in an FTZ and re-exported without U.S. duties or limits. Merchandise can be brought into an FTZ to be stored, exhibited, repackaged, assembled, or used for manufacturing free of customs duty, quota and other import restrictions until the decision is made to enter the goods into the U.S. market. Foreign Trade Zones are used for a variety of purposes and commodities within complex global supply chains. For example:

- **Cash Flow**. Customs duties are paid only when imported merchandise is shipped into the U.S. Customs territory. Merchandise may be held in inventory in the FTZ without Customs duty payment. Merchandise Processing Fees are owed only when and if merchandise is transferred out of the FYTZ.

- **Exports**. No customs duties are paid on merchandise exported from a FTZ.

- **Spare Parts**. To service many products, spare parts must be on hand in the United States for prompt shipment. Spare parts may be held in the FTZ without Customs duty payment.

- **Quota Management.** Merchandise may be held in a FTZ even if it is subject to U.S. quota restriction. When the quota opens, the merchandise may be immediately shipped into U.S. Customs territory.

- **Quality Control.** The FTZ may be used for quality control inspections to insure that only merchandise that meets specifications is imported and duty paid. All other materials may be repaired, returned to the foreign vendor, or destroyed under Customs supervision.

- **Inventory Control.** The FTZ is subject to U.S. Customs Service supervision and security requirements. Operations in a FTZ require careful accounting of receipt, processing, and shipment of merchandise. Firms have found that the increased accountability cuts down on inaccurate inventory, receiving and shipping concerns, and waste and scrap. Merchandise consumed in processing in a FTZ generally is not subject to U.S. Customs duties.

- **Exhibition.** Merchandise may be held for exhibition without Customs duty payment.

- **Reduced Insurance Costs**. The insurable value of merchandise held in a FTZ need not include the Customs duty payable on the merchandise. Some users of FTZs have negotiated a reduction in cargo insurance rates because imported merchandise is shipped directly to a FTZ without the opportunity for potential pilferage at deepwater ports or major international airports.

The advantages of a Foreign Trade Zone are, of course, highly specific to the import flows and company circumstances involved. Most of all, and FTZ offers flexibility and potential savings to creative shippers and receivers who can take advantage of these opportunities.

Southern California has several FTZs, including:

- FTZ 50 – Long Beach
- FTZ 202 – Los Angeles
- FTZ 205 – Port Hueneme
- FTZ 236 – Palm Springs
- FTZ 243 – Victorville
- FTZ 244 – Riverside County
- FTZ 257 – Imperial County

The hierarchy of FTZs is complex. These regional FTZs are managed and authorized by the federal government. Each FTZ can have many Sub Zones, of which there are 439 in the U.S. also administered by the federal government. Each Sub Zone can have many operators, and each operator can have many locations. For instance, Alps Manufacturing is an FTZ operator at a location in Garden Grove and at another in Compton. Operators frequently change, and the locations each operator sets up as an FTZ change depending on need. There is a constant stream of applications to set up new Sub Zones and another stream of applications to become FTZ operators. Most of the facilities discussed it the case studies offer Foreign Trade Zones.

Container Depots

Containers are stored, maintained, and interchanged at two principal locations: the marine terminal container yards (CYs), and the off-dock container depots. The marine terminal CYs are part of the port terminal complex and operated by the marine terminal operators on behalf of the ocean carriers. Container depots are usually owned and operated by separate, specialized firms.

Existing off-dock container depots already handle large numbers of empty containers. Many empty containers are already stored off-dock in container depots operated by Container-Care, Global Intermodal Services, Shippers' Transport, FastLane, and other firms. These depots handle both carrier-owned containers and leasing company containers, and have the capability of accepting containers from one trucker and releasing them to another.

Container depots have three major functions: storing containers that are currently surplus, acting as a supply point for empty containers, and servicing/repairing containers under contract.

Refrigerated container depots service, maintain, and store refrigerated ("reefer") containers. Reefer containers are heavily insulated ocean-going boxes with refrigeration equipment. The power supply for refrigeration is either a portable diesel-powered generator ("genset") that can travel with the container or electrical power from a fixed outlet in a container yard. Reefer containers are used for produce, meat, dairy products, frozen foods, and other import or export commodities requiring refrigeration or temperature control. These commodities are sensitive, so the containers must be clean, in good operating condition, and often chilled before loading. Collectively, the activities required before loading are called "pre-tripping." After the container is loaded, the container may be returned to the depot to adjust the operation, make repairs, add controlled-atmosphere gasses (often nitrogen), or maintain the generator set that supplies mobile electrical power. In the past, all these functions were typically performed in the marine terminal. Off-terminal reefer container depots emerged to perform these functions more efficiently, conserve terminal space, and give truckers more flexible access to reefer services.

Reefer depots also typically store containers for longer periods (e.g. more than a week and up to several months) between peak season demands, or while awaiting repair or disposition. Longer-term storage does not have the same need for port proximity, and more closely resembles the storage of dry containers without routine servicing or frequent truck trips. The bulk of the longer-term storage functions could be relocated inland.

There are some potential advantages to locating a container depot inland.

- Container depots need inexpensive space away from sensitive residential and commercial development, where inland points have an advantage.
- The availability of a container depot could be a step in encouraging reuse of empty containers.
- Were the container depot to become a source of "pre-tripped" refrigerated containers as well as dry vans, truckers could reduce the need to dray pre-tripped reefers from other sources.

Depot capacity is a function of size (acreage) and stacking height.

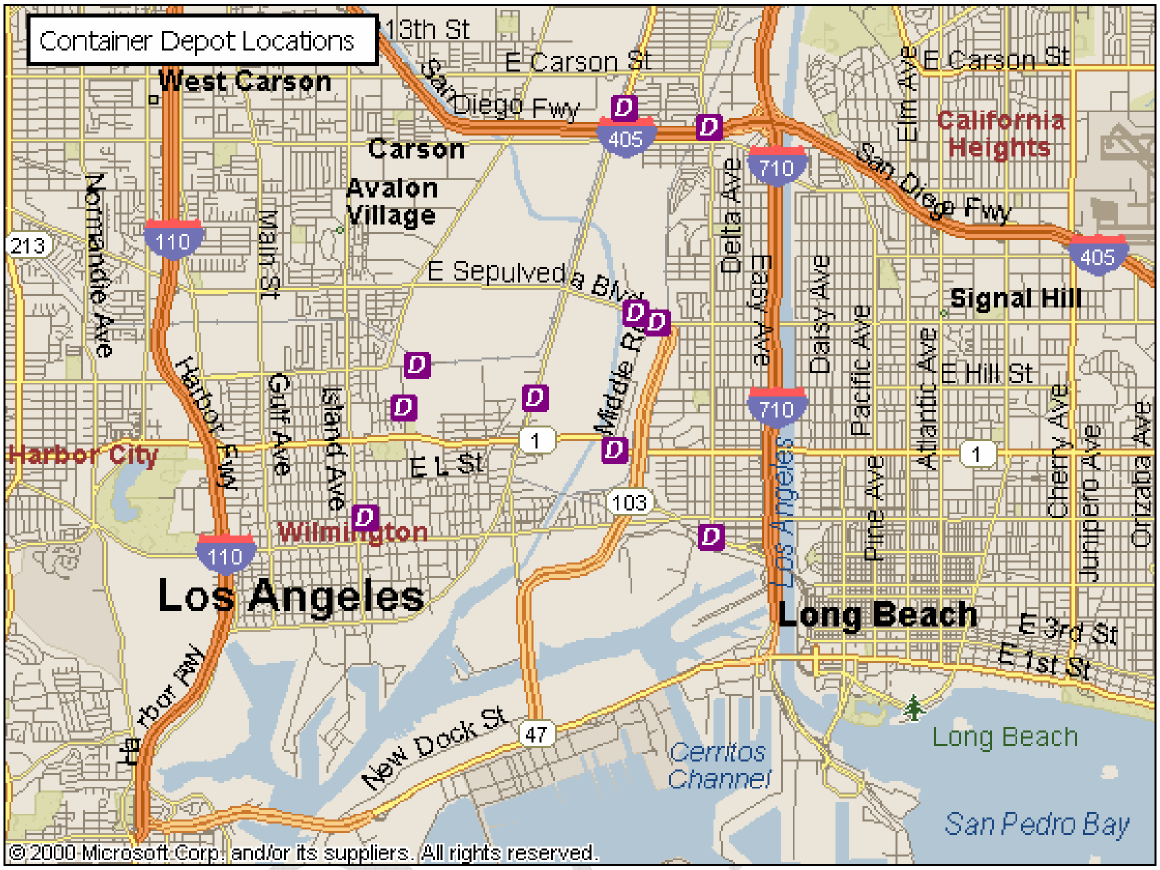
- Depot operators have reported difficulty in expanding at existing locations or securing new sites in the same general area. The alternative to site expansion is higher stacking.
- Where permitted, North American depot operators prefer to stack containers six-high (seven-high stacking is used overseas), although the average is lower. A stack of six containers is 48-57 feet high, the rough equivalent of a six-story building. Many communities object to such large container stacks, and there has been community pressure in Southern California and elsewhere to limit the height of container stacks.

The aerial photo in Exhibit 32 shows a container depot on East Opp Street in a mixed commercial/industrial area of Wilmington. The prominence of the depot is obvious (note the shadows of the container stacks), as is the tightly constrained site. The expansion ability of this heavily used depot, like other depots in similar circumstances, depends on the willingness of local planning authorities to allow such land uses on adjacent parcels.

Exhibit 32: Container Depot

Exhibit 33 shows the approximate locations of container depots in the port area (actual locations may have changed since the data were gathered). Most are clustered in the area north of the ports bounded by I-110, I-405, and I-710. This area has historically been home to numerous light and heavy industrial uses.

Exhibit 33: Container Depot Locations



The ability of container depots to offer adequate capacity near the ports is critical to any increase in depot-direct off-hiring or any long-term potential development of off-dock empty return depots. As noted in the section that follows, the economics of depot-direct off-hiring are not so compelling as to justify significant detours by draymen, and the longer the detour the more the drayman must be compensated. In addition, the VMT and emissions savings associated with depot strategies depend on the detour length: the farther the drayman must go out of his way, the less the VMT and emissions savings.

Most existing depot capacity is about 4 miles from the ports, and 1-2 miles from the nearest I710 exit. This defines a fairly narrow area in which to locate more depot capacity to accommodate cargo growth and changes in empty container logistics. Communities in this area, like communities elsewhere, are becoming increasingly sensitive to industrial development and truck traffic. Container depots have become the focal points of public land-use planning and zoning controversies in San Pedro, Oakland, Chicago, and elsewhere.

Heavy Commodities and "Overweights"

A major reason for transloading or consolidation is the opportunity to load an international container with more net weight than can be legally handled over the highway. Since ocean rates are typically based on the containerload rather than the cargo weight, customers have an incentive to maximize the amount of heavy cargo they can pack into each container.

As Exhibit 34 shows, the state highway gross weight limit of 80,000 lbs. limits the load capacity of a typical 40' ISO container to around 47,300 lbs. An intermodal rail option would allow the container to be loaded to its full maximum load of 59,000 lbs., a 25% advantage. Exhibit 34 also shows that there is no real advantage for 20' containers since the highway limit permits loading them to their full capacity.

Exhibit 34: Highway and Rail Weight Limits

Category	40' ISO Box Typical	20' ISO Box Typical
Tractor Weight	18,000	18,000
Chassis Weight	6,500	6,600
Container Weight	8,200	4,890
Total Tare	**32,700**	**29,490**
Highway Max	80,000	80,000
Highway Load Max	**47,300**	**50,510**
Container Load Limit	**59,000**	**48,020**
Rail Weight Advantage	11,700	-
% Rail Advantage	**25%**	**0%**

Exhibit 35 shows the resulting 5:4 ratio for highway versus rail shipment and the implied consolidation opportunity.

Exhibit 35: Consolidation Ratios

40' ISO Container	By Highway	By Rail
Load Limit	47,300	59,000
Containers to Ship 236,000 lbs	5	4
Shipment capacity	236,500	236,000

A concrete, real-world example of the potential economic leverage of overweight commodities and consolidation can be found in wine or other beverage exports. Information from one shipper indicates that existing containers can be loaded to an average of about 45,000 lbs. to be consistently within highway weight limit due to variations in tractor and chassis weight. If the customer could load the same container to 55,000 lbs. in an intermodal service there would be substantial savings in both drayage and ocean carriage.

One such shipper currently exports about 560 annual loads through Oakland from a single Northern California location. Round trip port drayage is about $625 per container for an annual cost of $350,000. At 55,000 lbs. each the shipper would move only 457 containers for the same export volume. If the shipper paid a total intermodal rate equal to the drayage cost ($625), the company would save $64,205 annually, some of which would have to cover the cost of consolidation near one of the intermodal terminals. There would also be savings on the ocean freight. Each container load costs roughly $4,000 to ship to its European destination. The 560 containers shipped at present cost about $2.24 million. Shipping 457 loads at 55,000 lbs. each instead would save the company $410,909 annually.

Regulatory agencies can designate highway and surface street routes with higher weight capacities, so-called "overweight" routes. In the vicinity of the some ports, a network of such routes connects transloading and consolidation facilities to the marine terminals allowing legal movement of "overweight" containers.

Options for inland ports include developing such routes or developing suitable transloading facilities adjacent to the intermodal terminals. As the role of international trade in the Southern Arizona grows, it will become increasingly advantageous to handle overweight containers in a safe and controlled manner within the region. Creating overweight corridors linking other areas to an inland port would extend this capability to more of the region.

Empty Container Supply

Most export loads require draying in an empty container, and each import load generates an empty to be returned to a port. If the need for empty movements can be reduced or rationalized, total cost can be reduced.

There are at least three possibilities for rationalizing empty container flows.

- **Using rail shuttle service to position empties at inland port depots.** Ocean carriers may be able to use their negotiating position with the railroads to obtain favorable rates for moving empties to inland supply points.

- **Reusing import empties for export loads.** As the import traffic to Southern California distribution centers grows, an increasing number of international empties will be generated in the SCAG Region. Some truckers hold on to a handful of containers for potential reuse, but the effort is piecemeal and impact is small. If these empties could be turned in to an inland depot and accumulated in significant numbers, truckers would reduce the need for empty returns and gain a local source of supply.

Each of these possibilities is an opportunity to reduce the total costs of moving containers by rail between an inland port and the seaports, and an opportunity to improve regional container supply.

The latter consideration is particularly important for some potential businesses. Empty container supply is a key factor in encouraging "urban ore" export businesses such as waste paper, recycled plastic, and scrap metal. In the course of interviews with businesses of these kinds in other studies, it became apparent to the Tioga team that the ready availability of suitable ISO boxes is a major consideration in locating these businesses and in turning a local supply of waste products into containerized exports. To the extent that depots or other arrangements in Southern California can insure a supply of empty containers, such businesses would be more inclined to locate there.

LTL Terminals

Terminals for less-than-truckload (LTL) motor carriers are sometimes considered as candidates for inclusion in an inland port/logistics park development. LTL terminal location choices reflect market demand, operational needs, and labor rules.

Market demand. LTL terminals exhibit scale economies. The decision on if and where to locate a terminal is a function of both total demand and density. In the absence of natural barriers, LTL motor carriers typically operate pickup and delivery service over a 20–50 mile radius from a terminal. A locality with sufficient potential business in such a service area could be a candidate for a terminal. If the potential demand is denser, the target market may be served by a larger terminal or multiple small terminals. If the available freight is not enough to justify a terminal the region might be served through an agent relationship with a local operator.

Operations Requirements. Within a given market region, LTL terminal location choices are driven by:

- Availability of low-cost land
- Freeway access and route configuration.
- Driving distance and time to serve the market

While it might initially seem that LTL terminals should be centrally located in the urban area, , central urban locations are less likely to have large tracts of available low-cost land or easy access to interstate highways. Exhibit 36 shows reported LTL terminals in the SCAG region.

Exhibit 36: LTL Terminal Locations

As Exhibit 36 shows, the LTL terminals tend to concentrate near major freeways in a handful of regional market areas.

- Central Los Angeles
- Long Beach/Gateway Cities
- Orange County
- The Inland Empire

- Ventura County
- San Fernando Valley

Regional LTL terminals reported in directories and websites are listed in Exhibit 37. Note that this list is probably not completely accurate, as terminal closures and relations can happen quickly.

Exhibit 37: Reported LTL Terminals

Company Name	Address	City	State	ZIP
ABF	8001 Telegraph Road	Pico Rivera	CA	90660
ABF	405 E Alondra Blvd	Compton	CA	90220
ABF	12200 Montague St.	Pacoima	CA	91331
ABF	1601 North Batavia	Orange	CA	92867
ABF	10744 Almond Ave.	Fontana	CA	92337
ConWay	1955 E Washington Blvd	Los Angeles	CA	90023
ConWay	12903 Lakeland Road	Santa Fe Springs	CA	90670
ConWay	20805 S. Fordyce Avenue	Long Beach	CA	90812
ConWay	12466 Montague Street	Pacoima	CA	91331
ConWay	2102 North Batavia Avenue	Orange	CA	92867
ConWay	20697 Prism Place	Lake Forest	CA	92632
ConWay	2900 Camino Del Sol	Oxnard	CA	93030
Di Salvo Trucking	6121 Randolph St.	City of Commerce	CA	90040
FedEx Freight	853 S Maple	Montebello	CA	90640
FedEx Freight	3200 Workman Mill Rd	Whittier	CA	90061
FedEx Freight	15200 S Main St	Gardena	CA	90248
FedEx Freight	11911 Branford St	Sun Valley	CA	91352
FedEx Freight	1379 N. Miller St	Anaheim	CA	92806
FedEx Freight	56 Fairbanks Rd	Irvine	CA	92618
FedEx Freight	11153 Mulberry Ave	Fontana	CA	92337
FedEx Freight	3501 Sturgis Rd	Oxnard	CA	93030
GI Trucking	14727 Alondra Blvd.	La Mirada	CA	90638
GI Trucking	1849 W. Valley Blvd.	Colton	CA	92324
GI Trucking	1555 Flynn Rd.	Camarillo	CA	93012
GI Trucking	45 W. 5th St.	Calexico	CA	92231
Motor Cargo	7754 Paramount Blvd.	Pico Riviera	CA	90660
Motor Cargo	1260 Saviers Rd.	Oxnard	CA	93033
Old Dominion Freight Line	1225 Washington Blvd.	Montebello	CA	90640
Overnite	2747 Vail Ave	Commerce	CA	90040
Overnite	7754 Paramount Blvd	Pico Rivera	CA	90660
Overnite	650 S Acacia Ave	Fullerton	CA	92831
Overnite	12455 Harvest Dr	Mira Loma	CA	91752
Overnite	9880 Banana Ave	Fontana	CA	92335
Overnite	2650 S Willow Ave	Bloomington	CA	92316
Overnite	43857 Sierra Highway	Lancaster	CA	93534
Roadway	4700 South Eastern Avenue	Los Angeles	CA	90040
Roadway	21300 Wilmington Ave.	Carson	CA	90810
Roadway	12200 Montague St.	Pacoima	CA	91331
Roadway	640 West Taft	Orange	CA	92865
Roadway	1130 S. Reservoir St.	Pomona	CA	91766
Roadway	18298 Slover Ave.	Bloomington	CA	92316
Roadway	237 Lambert St.	Oxnard	CA	93030
Roadway	17401 Adelanto Rd.	Adelanto	CA	92301
Roadway	1392 Engineer St.	Vista	CA	92083
Silver Eagle Freight	3363 Linden Ave.	Long Beach	CA	90807
Swift	221 E. D St	Wilmington	CA	90744
Swift	9951 Banana Ave	Fontana	CA	92335
UPS	1800 N Main St	Los Angeles	CA	90031
UPS	13233 Moore St	Cerritos	CA	90703
UPS	1100 Baldwin Park Blvd	Baldwin Park	CA	91706
UPS	17111 S Western	Gardena	CA	90247
UPS	1331 S Vernon St	Anaheim	CA	92085
UPS	16000 Arminta St	Van Nuys	CA	91406
UPS	12745 Arroyo	Sylmar	CA	91342
UPS	22 Brookline Dr	Aliso Viejo	CA	92656
UPS	1457 E Victoria Ave	San Bernardino	CA	92408
USF Bestway	575 East Weber Ave	Compton	CA	90222
USF Bestway	12100 Montague St	Pacoima	CA	91331
USF Bestway	2200 North Batavia St	Orange	CA	92865
USF Bestway	10661 Etiwanda Ave	Fontana	CA	92337
USF Reddaway	11937 Regentview Ave	Downey	CA	90241
USF Reddaway	9120 San Fernando Rd	Sun Valley	CA	91352
USF Reddaway	300 S State College	Fullerton	CA	92831
USF Reddaway	10646 Almond Ave	Fontana	CA	92337
Watkins Motor Lines	4500Bandini Blvd.	Los Angeles	CA	90040
Watkins Motor Lines	12200 Montague St.	Pacoima	CA	91331
Watkins Motor Lines	310 W. Grove Ave.	Orange	CA	92865
Watkins Motor Lines	14251 Slover Ave.	Fontana	CA	92337
West Ex	13901 Mica St.	Santa Fe Springs	CA	90670
Yellow	9933 East Beverly Blvd	Pico Rivera	CA	90660
Yellow	12250 Clark St	Santa Fe Springs	CA	90670
Yellow	15400 South Main St	Gardena	CA	90248
Yellow	11300 Peoria St	Sun Valley	CA	95407
Yellow	700 N Eckhoff St	Orange	CA	92868
Yellow	1500 West Rialto Ave	San Bernardino	CA	92410
Yellow	2685 Sherwin Ave	Ventura	CA	95963
Yellow	4313 Atlas Ct	Bakersfield	CA	93308

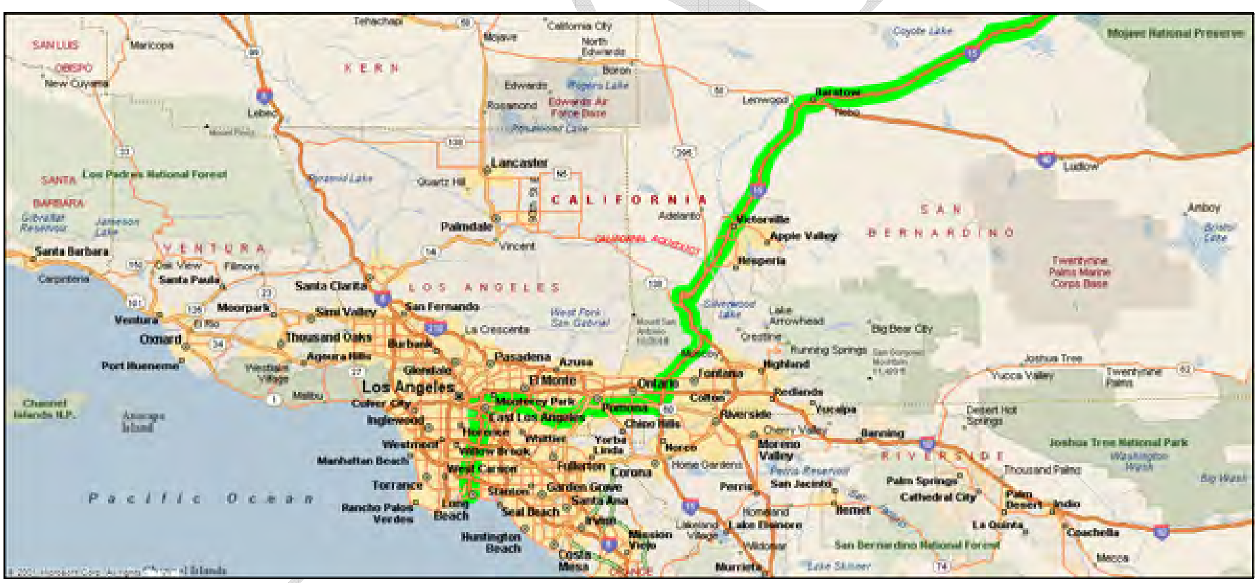
Labor rules. The largest LTL carriers are unionized. The way in which large markets are divided into terminal service territories is dictated in part by union rules. Changes in terminal location or territory definition entail union negotiations. Tioga verified through the in-depth interviews that LTL carriers typically have precisely defined market territories for each terminal.

Inland port potential. Co-location of LTL terminals with inland ports would be most advantageous when a large portion of the long-haul LTL trailers moved via rail intermodal. The location of the Yellow Freight terminal in San Bernardino adjacent to the BNSF intermodal terminal is a case in point. The share of OTR trips that can be shifted to rail, however, is limited by the Master Freight Agreement between the major LTLs and the driver's union. Any LTL terminal must therefore be located to best serve the majority of the OTR and pick up and delivery truck trips. Location near an intermodal terminal can be decisive in a choice between two good markets, but cannot override a market–based decision.

LCV Trucking

Regional infrastructure proposals include a system of "truckways" between the Ports of Long Beach and Los Angeles and Barstow. The route under discussion is a combination of I710, SR60, and I15 as depicted in Exhibit 38.

Exhibit 38: LCV Truckway Route (Approximate)

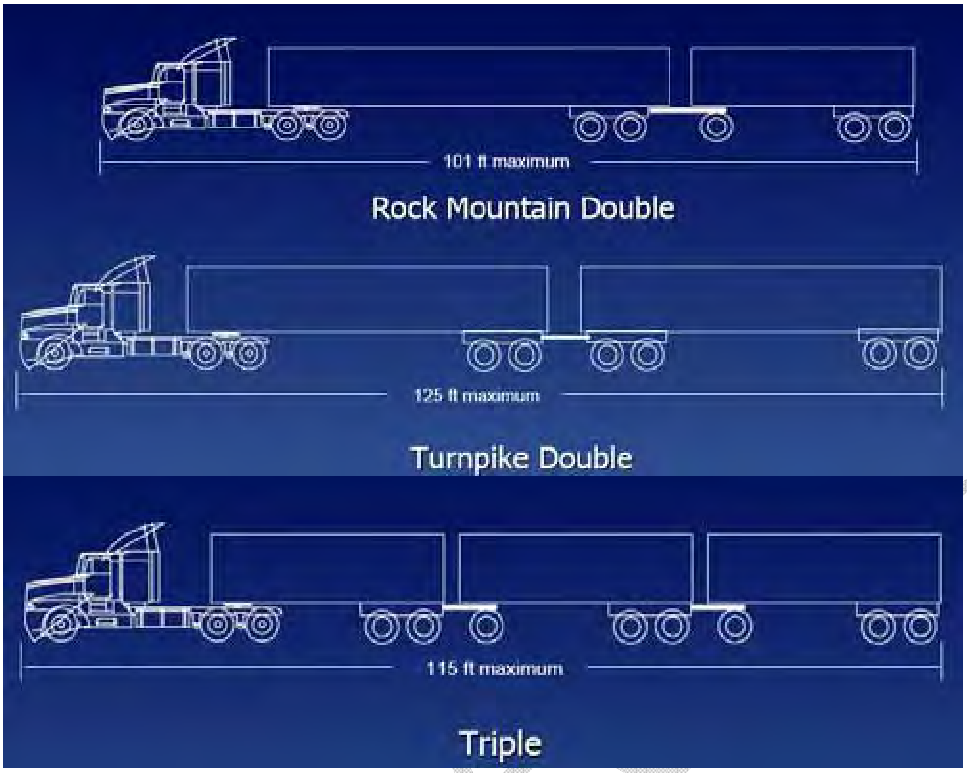


One option for funding truckways is to allow the truckers to operate longer combination vehicles (LCVs). Longer combination vehicles, are tractor-trailer combinations with two or more trailers that may exceed 80,000 pounds gross vehicle weight (GVW). The ability to operate LCVs increases the productivity of the tractor and driver. It is thought that truckers would be willing to incur the incremental cost of tolls to obtain the productivity benefits.[5]

[5] An analysis of LCV economics is beyond the scope of this project. The study team has therefore assumed that development of LCV tollways themselves would lead to a demand for LCV staging areas.

LCVs typically include three vehicle types. (Exhibit 39)

Exhibit 39: Longer Combination Vehicles



As pictured, LCVs equipment involved usually include one or more *converter gear units* (also known as *dollies*) used to connect multiple trailers. The possibilities are:

- Rocky Mountain doubles – formed by adding a 28' trailer to a long single semi trailer.
- Turnpike doubles – formed by adding a second long semi trailer behind the first long semi trailer.
- Triples – formed by adding a third 28' trailer to a set of two.

Operation of LCVs is prohibited in California, but operations are relatively common in certain other circumstances in other states contiguous to California, including Nevada and Oregon (but not Arizona) .

LCVs need space available at the start of the trip to hook up the "extra" converter gear and trailer in the combination and again at the end of the trip to detach the extra converter gear and trailer. Traditionally that has been done in a "break-up area" furnished by the state highway department or toll road authority immediately before entering a toll booth.

The driver requires sufficient space to uncouple his existing combination and reposition the trailers and converter gears into the correct sequence. There is also a space requirement for dropped trailers and dropped converter gears to be temporarily stored awaiting their next use. The number of dropped trailers and converters is related to level of activity and business cycles. Each company has its own converter gears, they are not a common user pool.

The entrance to the lot has to be positioned such that it is prior to toll collection when making up a LCV and after toll collection when breaking up a LCV. Perimeter lighting of the area is mandatory, and depending on the local situation, a certain level of security may be required. Ultimately, the level of LCV patronage on the truckway determines the size of the breakup lot.

Getting the LCV equipment to/from the truckway is the single most important consideration. There are three possible scenarios:

- Normal – the LCV operates on the truckway only. The vehicles that assemble into the LCV are separately shuttled between the breakup lot and the truckers nearest facility.

- Operate to/from an adjacent common user freight terminal or drop lot.

- Operate over local streets – the LCV does not make up or break up at the break up lot, instead it drives over local streets to a nearby private facility at which it is assembled or disassembled.

Originally, all LCV operations on toll roads were required to use the break up areas at the entrance to the toll road to assemble/disassemble the LCV combination so that operations over roadways off the toll road were "highway legal" – meaning that they were as allowed by state regulations. That practice resulted in lower toll road patronage than if the LCVs could operate between the entrance/exit to the toll road and a nearby facility. It is significantly more efficient if the "extra" box does not have to be separated and then separately shuttled by another truck and driver to/from the toll road breakup area. LCVs can be allowed to operate only on city and country roads that are not a part of the federal National Highway System (basically all Interstate and State designated routes).

It is now common for LCVs to enter/exit from the toll road at interchanges that are situated at city streets or county roads and to operate over such local streets for a short distance, generally only one to two miles, to the carrier's private facility. Often they can access the toll road on either a private road or over a short distance on city streets that permit LCVs.

The idea of being located in closer proximity to the entrance/exit to the toll road is critical. The more efficient the shuttle to/from the breakup area, the more probable it is that truckers will use the toll road either with LCVs or with normal truck configurations. If, for other reasons, it is not advantageous for the trucker to locate at or near the entrance/exit to the toll road, it is less probable that the trucker will use the toll road. The lesser probability is more common with private trucking than with commercial trucking. That is because usually the private trucking is appended to the shipper's manufacturing or distribution facility and it is not probable that it is advantageous to relocate the entire manufacturing or distribution facility.

LCV staging lots could be beneficially co-located with LTL terminals. It is likely, in fact, that at least some LTL carriers would locate terminals at staging lots or at approved LCV access routes once an LCV system was developed.

Feasibility of an LCV breakup lot as part of an inland port or logistics park depends, of course, on the existence of an LCV highway or tollway system.

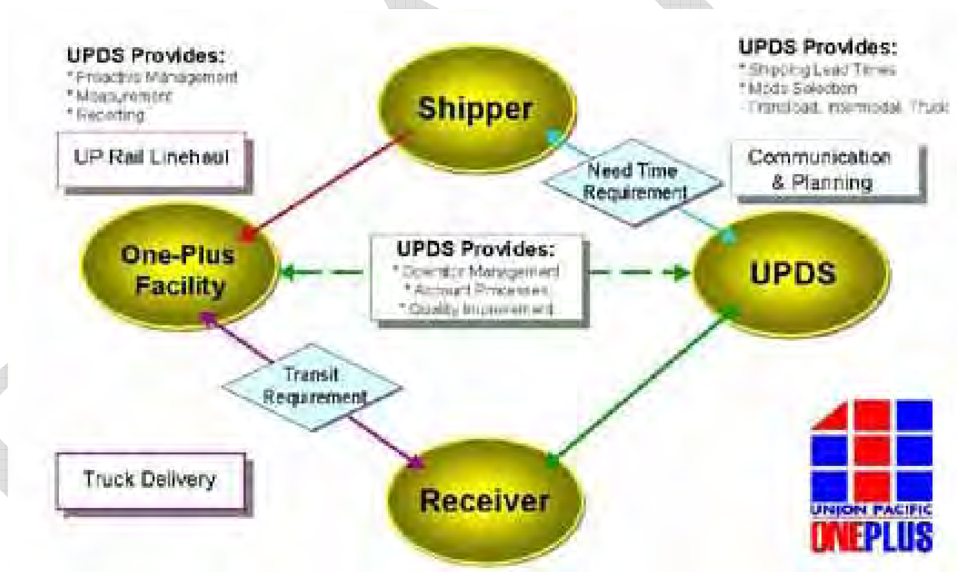
Experience to date suggests that LTL carriers would be the primary users of an LCV system. Most LTL carriers have fleets of 28' trailers and converter units that already operate as triples where possible (e.g. Oregon and Nevada). To take advantage of LCV routes, LTL carriers will need to either establish operations at staging lots, establish approved LCV routes to existing terminals, or establish new terminals on LCV surface routes.

Co-locating an LCV staging area with LTL terminals or various inland port functions would require a large site at an LCV highway exit. The availability of such sites will depend on the final location and configuration of the LCV highways or tollways.

Rail-Truck Bulk Transfer Facilities

Rail-truck bulk transfer facilities typically receive bulk commodities in carload lots by rail, store them in the railcars, and transfer them from the railcar to a truck for final delivery**.** Exhibit 40 illustrates a generic transload process.

Exhibit 40: Sample Rail Transload Process



Source: Union Pacific Distribution Services

For most commodities, there are 3 to 4 truckload equivalents in a single rail car carrying 70 to 125 tons. These facilities tend to be located close to railroad freight yards to enable local rail switching crews to move railcars in and out of the site. These facilities handle bulk commodities for consignees who either lack a rail siding or who place orders for less than a full carload. Often, multiple producers of the same commodity with have rail carloads of competitive products on site at the same facility. The goods are either liquids such as asphalt, alcohol, ethanol, specialty chemicals, or acids, dry bulk such as flour, plastic pellets, catalysts, or fertilizers, or gases such as propane, anhydrous ammonia, or nitrogen. Exhibit 41 below shows a transfer facility moving liquid bulk commodities between rail tank cars and tank trailers.

Exhibit 41: Liquid Bulk Transloading

When transloading lumber (and other building materials such as wallboard, decorative stone, and roofing), transload facilities typically mix shipments that arrive in full carloads to create outbound truck shipments to construction sites. Where these facilities are part of a major wholesale operation, the railcar is not used for storage (Exhibit 42 below).

Exhibit 42: Lumber Transloading

Local steel and other metal fabricators and wholesalers draw their supply of coils, bars and other shapes from manufacturers, often by rail. Depending on the economics of the supply chain and the demand for a given product, the manufacturer will use a rail/truck transfer facility to supply a given clientele. Steel transfer facilities often have an enclosed site and an overhead crane bay (Exhibit 43 below) to lift heavy shipments out of coil cars and low-sided gondola rail cars.

Exhibit 43: Coil Steel Transloading

Auto Ramps

Autos and light trucks (finished vehicles) are usually moved from assembly plants to destination regions via special bi-level and tri-level railcars. At destination, no auto dealer or group of dealers is set up to receive an entire railcar. Instead, the manufacturers use rail distribution centers, often called "auto ramps".

There are three types of auto ramps in Southern California.

- Most auto ramps in the Los Angeles region are destination preparation and delivery centers that transload the vehicles to trucks equipped with auto racks for dealer delivery. There are two on the UP, one at Mira Loma (Exhibit 44). There are two on the BNSF in the Los Angeles area, including one in San Bernardino (Exhibit 45), and BNSF is looking for space for more.

- Imports through Port Hueneme and Long Beach are transferred to trucks and also to railcars at both ports. The import facility can have a large amount of outbound trucking, and some or a lot of rail. UP has two such facilities; BNSF has one.

- Exports are transferred from railcar to ocean vessels at Long Beach. The export facility usually has very little inbound trucking.

Exhibit 44: UP Auto Distribution Facility at Mira Loma

Exhibit 45: BNSF Auto Facility, San Bernardino

Given the existence of several auto ramps in the region, including the major facilities at Mira Loma and San Bernardino, the need for additional auto facilities in the Inland Empire appears minimal. The SCLA site at Adelanto has been considered for an auto distribution facility to serve the expanding Victor Valley region.

Air Cargo Handling

There are three basic types of air cargo service.

- "Integrated" carriers such as UPS, FedEx, and DHL provide pickup and delivery and cover the full spectrum of services, from envelopes and parcels through large freight shipments.

- Passenger airlines such as United, American, and Southwest carry freight as "belly cargo" in the baggage area of passenger planes. Some airlines also operate all-cargo planes. These carriers market their cargo service directly to customers who provide their own pickup and delivery, and also market to air freight forwarders.

- All-cargo carriers, such as Panalpina or BAX, concentrate on freight rather than parcels or letters and usually rely on customers and air freight forwarders for pickup and delivery service.

These three types of carriers operate planes and require on-airport sites with runway access. The integrated carriers also have a network of "retail" counter locations linked to the airport by regular truck trips.

Air freight forwarders are a critical group of intermediaries that purchase service wholesale from the three types of carriers and sell service retail to customers. Air freight forwarders, such as Excel may also offer other services or operate as 3PLs. They are located either on-airport or near the airport, and truck freight to and from the carriers as individual items or loaded "igloo" containers.

An inland port with air cargo capabilities (e.g. a logistics or all-cargo airport) might therefore have both air carriers and air freight forwarders on-site. An inland port that is not also an airport may have air freight forwarders and "counter" offices of air cargo carriers on-site.

Major airports such as LAX or Ontario are typically surrounded by air cargo handing facilities. These facilities include some operated by major airlines to handle "belly cargo' on passenger flights, some operated by all-cargo carriers, some operated by FedEx, UPS, and other parcel and express companies, and some operated by air cargo forwarders and others who do not have their own aircraft. The basic function of these facilities is to transfer air cargo between the aircraft and trucks. An important distinction can be made between air cargo handled loose or on pallets, and air cargo handled in specialized containers (sometimes called "igloos") for specific aircraft.

Air cargo facilities tend to be either single-user terminals for large carriers such as FedEx or UPS, or smaller multi-user facilities used by carriers with less air cargo (e.g. airlines handling only belly cargo) and air freight forwarders.

As the case studies point out, logistics or all-cargo airports also attract aviation businesses that require runway access but that do not handle cargo for others. These businesses typically include flight schools, business aircraft leasing or maintenance, and suppliers to the aircraft industry. These business types fall outside the purview of this study as their location or operation does not appreciably affect the movement of freight at issue. Moreover, they are almost always located at an airport, so there is no overriding economic development purpose in influencing their location decisions.

Many of the all-cargo/logistics airports discussed in case studies have been largely unsuccessful at attracting large-scale economic development on the basis of air cargo services (although some have attracted DCs on the basis of economical land and advantageous location). The reason is simple: very few shippers or consignees of any size move enough of their freight by air to make an airport location attractive. Most DCs, for example, move the bulk of their business by truck, making locations with freeway access more desirable.

The case studies point out that relatively few shippers or consignees rely so heavily on air freight that they prefer to locate near or at an airport. For most businesses, shipping by air is an adjunct to trucking, and air freight is typically minimized due to its high cost. The three Inland Empire logistics airports already compete for those few shippers or consignees looking for an airport location, so there would be little benefit to creating yet another competitor in this limited market.

Most air cargo moving to or from the Inland Empire is handled at LAX or Ontario, both of which face long-term capacity issues. The Inland Empire has three logistics airports: San Bernardino International, March GlobalPort, and the Southern California Logistics Airport at Victorville. (Exhibit 46)

Exhibit 46: Inland Empire Cargo Airports

The air cargo element of the Regional Transportation Plan anticipates substantial air cargo growth, but concludes that the existing airport system as a whole provides adequate capacity through 2030. (Exhibit 47)

Exhibit 47: SCAG 2004 RTP Air Cargo Element

2030 Aviation System Air Cargo Tonnage (x 000)
(All Variations evaluated)

	BUR	JWA	LAX	LGB	MAR	ONT	PSP	PMD	SBD	SCL	TOTAL
Constrained (No HSR)	83	43	3,268	123	825	2,605	146	143	821	283	8,340
Moderate (ONT 3 rwys)	84	43	3,210	133	1,053	2,272	125	145	1,114	361	8,540
Preferred Aviation Plan	87	43	2,340	137	1,117	2,252	128	1,024	1,092	504	8,724
Preferred Aviation Plan (no HSR)	87	43	2,379	137	1,104	2,188	128	866	1,050	476	8,458

There appears, therefore, to be no need for additional air cargo capacity at another inland port location. Should there eventually emerge a need, the first choice would ordinarily be to expand capacity at one of the existing airports rather than to establish yet another in the crowded Southern California airspace. The three regional logistics airports likewise appear to have sufficient development space for air freight forwarders, and would be the preferred locations for future development of this kind.

All these considerations suggest that an additional inland port development in the Inland Empire area would not benefit from an air cargo component. Likewise, adding air cargo capabilities would not further SCAG's objectives for the study or SCAG's regional goals.

VI. Agile Port Concepts

Background

The term "agile port" has taken on many shades of meaning from a precise definition tied to military deployment to a generalized notion of increased port efficiency linked to inland transport. For the proposes of this project the study team endeavored to identify those elements of the broader agile port concept that would promote greater port throughput consistent with reduced VMT and emissions. In this connection:

- The objective of agile port operations is to reduce container dwell time at port terminals and increase their throughput capacity.
- The core of the concept is rail transfer of unsorted inland containers from vessel to an inland point where sorting takes place.
- The agile port concept trades off additional cost (handling) and inland space for increased port throughput.

Port of Hong Kong West Rail Concept

Exhibit 48 shows one of the original concepts later incorporated in the broader agile port idea. The West Rail plan was developed by TranSystems and Mercer Management Consulting in 1995-1997 for the Kowloon-Canton Railway Corporation (KCRC) to provide efficient intermodal rail service between the Port of Hong Kong at Kwai Chung and inland China. The design challenge was to maximize throughput at the only available near-port rail terminal site, a 37-acre parcel shown in Exhibit 48 as the Port Rail Terminal (PRT). To eventually handle up to 4 million annual TEU though this very small facility it would be necessary to transfer every container from the drayage trucks to the first available train slot with no sorting at all at the PRT. All trains would leave the PRT with a random assortment of containers. At the Northern Freight Yard (NFY) 30-35 miles north near the Chinese border, the containers would be transferred directly from PRT trains to one of several China-bound trains whenever possible, and stacked in a buffer area as needed.

The Northern Freight Yard was envisioned as the core of what could be come an "inland port", a concept that was then embodied only in the Virginia Inland Port.

"The NFY could become the nucleus of an "inland port" complex.

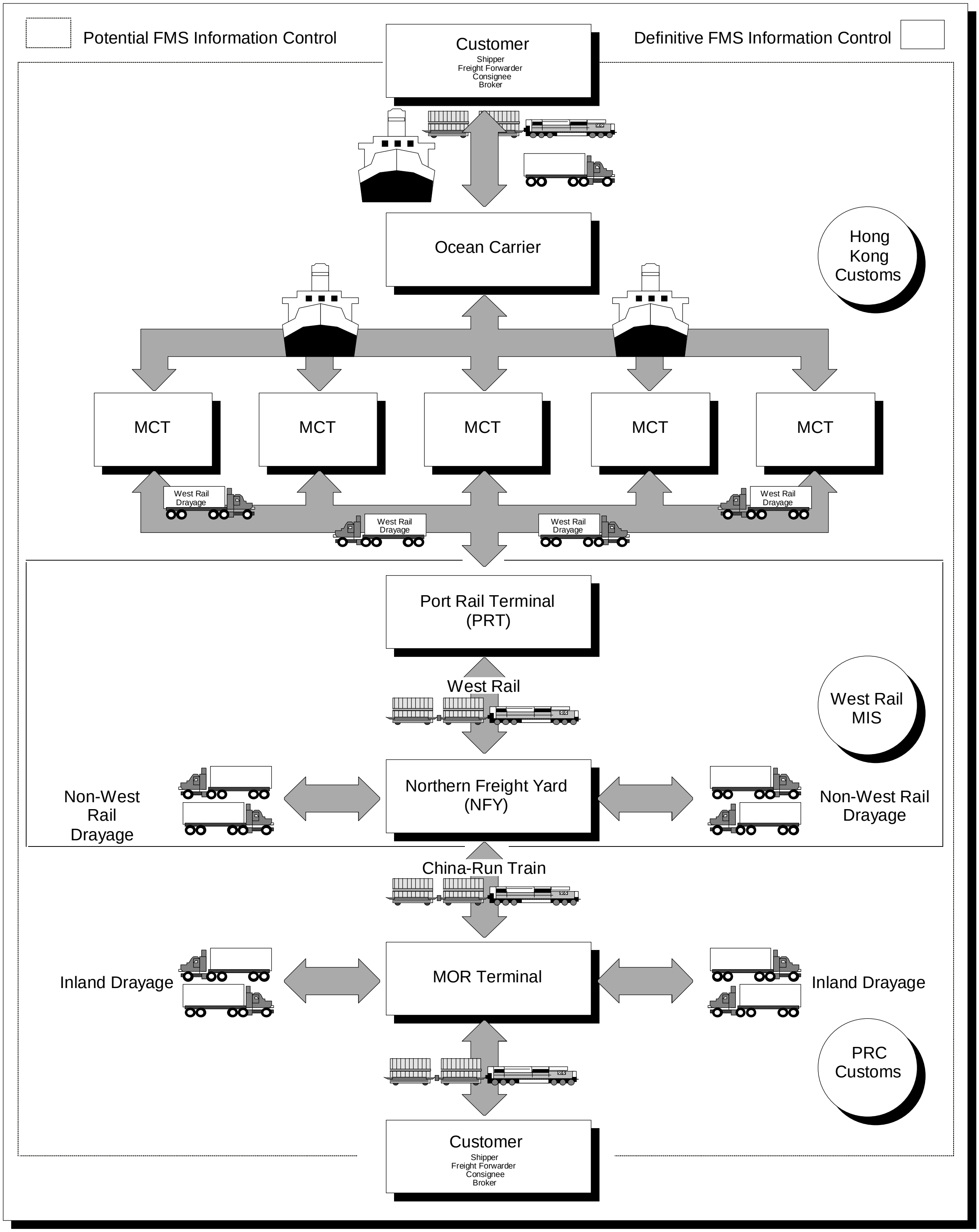
- *Development of Container Freight Stations (CFS) and container depots surrounding the NFY would generate additional volume and revenue for KCRC.*
- *Encourage rail movement of full containers from Guangdong Province and the Shenzhen Special Economic Zone to and from Kwai Chung instead of piecemeal truck moves.*
- *Container depots that distribute empties to Guangdong Province would be a source of northbound fill-in traffic for KCRC*

- *By adding CFS and depot capacity, and staging containers for movement to and from Kwai Chung, the activity surrounding the NFY would effectively add capacity to the Kwai Chung terminals and extend their reach inland.*

- *The NFY could likewise become a marshaling point for rail traffic to and from Shekou and Yantian."*

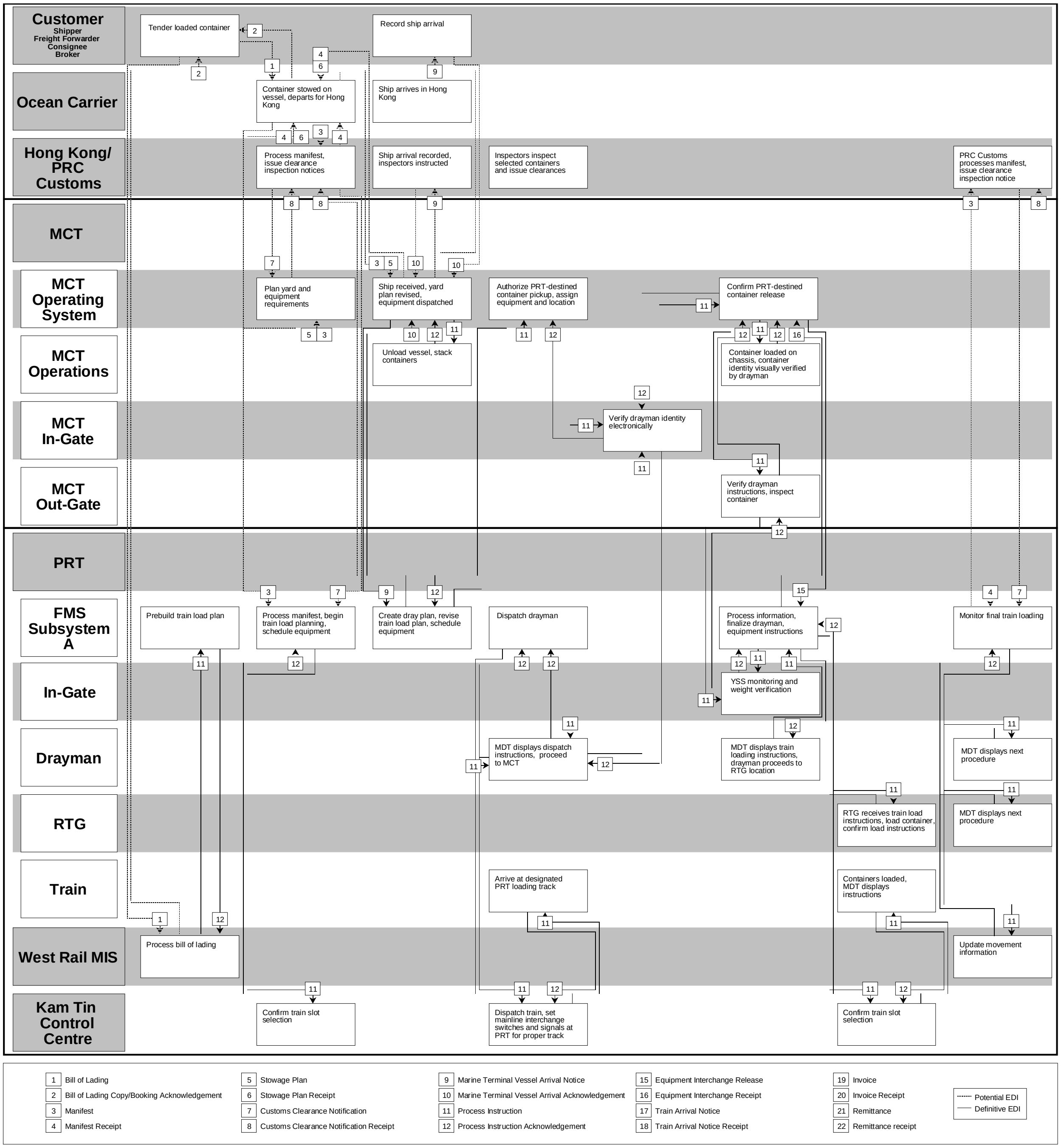
This proposed system was advanced through feasibility assessments and preliminary planning studies before being set aside with the transfer of Hong Kong to mainland Chinese governance. Its major operating philosophy, however, was incorporated in the agile port idea.

Exhibit 48: Port of Hong Kong West Rail Concept



A critical part of the West Rail proposal was the Freight Management System (FMS) alluded to in Exhibit 48. Exhibit 49 shows the flow of information through the proposed Freight Management System. Although the diagram may be most impressive for its complexity, the critical functions are applicable to agile port applications in Southern California.

Exhibit 49: West Rail Freight Management System



- Pre-arrival use of bill of lading and stowage plan information to create trip plans for import containers.

- Dispatch of drayage vehicles triggered by container availability information in the marine terminal operating system.

- Communication between the management information system (FMS) and drayage vehicles via Mobile Data Terminals, including direction to specific train slots for loading.

- Development of Northern Freight Yard transfer plans based on actual real-time container loadings at the PRT.

The West Rail plan and the FMS were designed to *"substitute superior information and operation control for scarce land area and capital equipment"*. In short, the ability of the system to move 4 million TEU through a 37-acre terminal was contingent on maximizing the availability and use of information at every step of the process.

Military Deployment Definition

Within the realm of rapid military deployment, port agility is defined as *the ability of a marine terminal to accommodate military load out operations while minimizing disruption to commercial operations.* (CCDoTT) This implies that an Agile Port either has unused capacity or can change its operations to accommodate military surge cargo without significantly impacting commercial operations. To the extent that this latent capacity is the result of changed/improved operations it may have commercial impact.

As defined this way, an Agile Port System (APS) has all the elements of any transportation system; terminals, ways, conveyance equipment (ships or vehicles), systems, and management.

Applying the Agile Port Concept in Southern California

How might elements of the Agile Port Concept be used to accomplish two goals?

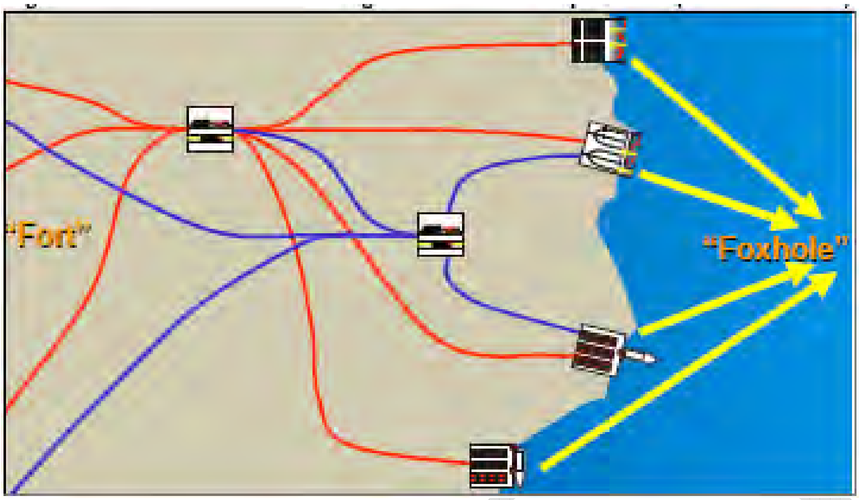
- Move truck traffic off congested Southern California highways.

- Increase the throughput of existing marine terminals.

These questions are relevant to public decision makers to the extent that they seek both growth in the port operations and employment while conserving capacity on the highway system. Also, in spite of the fact that a significant portion of the Agile Port system is designed to support military surge export operations without disrupting commercial (primarily import) operations, there are elements that can be helpful in accomplishing Southern California's goals.

Exhibit 50 illustrates a Agile Port System and its major components in a "fort to foxhole" system for rapid deployment of military materials. (Note that the agile port system in this manifestation is focused on outbound or export movements.)

Exhibit 50: Agile Ports in Military Deployment



Source: TransSystems, Inc. Presentation

The system as envisioned for military application defines five different kinds of terminals (Exhibit 51).

Exhibit 51: Agile Port Terminal Types

- Conventional marine container terminals are the terminals that are in place today.
- Ro-Ro (Roll-on Roll-off) marine terminals are also in place today for maritime auto carriers and barges, although they do not have the High Speed Sealift characteristics (which are not relevant for this study).
- Agile Port terminals, also called Efficient Marine Terminals, are optimized for on-dock rail transfer. The concept was demonstrated successfully in Tacoma, but no terminals have been built or operated on this basis.
- Fast Ship Terminal is a concept that uses a Container Platform Train (CPT) optimized for the proposed Fast Ship technology. These terminals have been designed in concept, but not built.

- The Intermodal Interface Center (IIC) is an inland port that serves as the "front door" of the port, providing as large a menu of required marine intermodal terminal services as possible.

These functions involve both an information warehouse linked to the marine container terminals as well as rail, marine and motor carriers and integration of various optimization systems to produce highly automated and optimized land side access solutions. This use of information to maximize system performance is the same idea embedded in the West Rail Freight Management System proposal (Exhibit 49).

In the conventional system that we have today both rail and highway corridors are used to bring cargo to/from the marine facility. The notional elements of the APS system involving the IIC and the EMT are conceived as being connected by a dedicated freight corridor. The Alameda Corridor is given as the first (and only) example of this kind of facility.

One goal is to take work out of the marine terminal where land and labor are expensive and move it inland where land and labor are less costly by moving as many conventional marine terminal functions to an inland port where land is less expensive, and objective consistent with rationalization of port-area land uses.

Applying the Agile Port Concept in Southern California

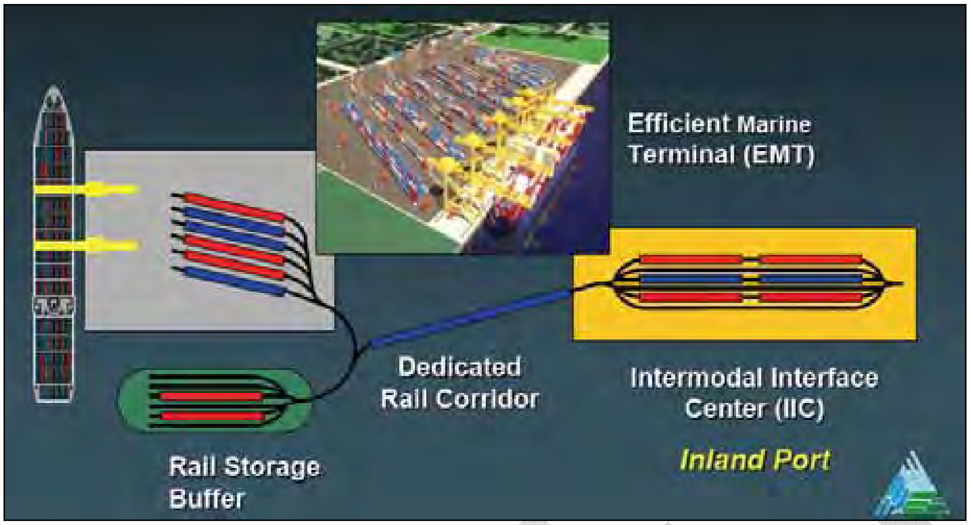
How might elements of the Agile Port concept be used to accomplish two goals?

- Move truck traffic off congested Southern California highways.
- Increase the throughput of existing marine terminals.

These questions are relevant to public decision makers to the extent that they seek both growth in the port operations and employment while conserving capacity on the highway system. Also, in spite of the fact that a significant portion of the Agile Port system is designed to support military surge *export* operations without disrupting commercial (primarily import) operations, there are elements that can be helpful in accomplishing Southern California's goals.

Exhibit 52 shows the key elements of the agile port concept as potentially applied within Southern California.

Exhibit 52: Agile Port System Elements



In principle:

- Existing marine container terminals would implement as much of the EMT concept as possible, chiefly the use of information and operational refinements to load import containers to rail as quickly and efficiently as possible.
- Adequate storage and support trackage would be available in the port area to facilitate building and blocking trains as required.
- While the rail corridor would not be dedicated, dedicated rail shuttles would connect the ports with one or more inland ports.
- At the inland port, additional sorting and blocking of rail cars and containers would yield outbound trains that could proceed intact to inland destinations.
- Westbound, the process would be reversed, with the inland port splitting, blocking, and sorting railcars and containers as needed to create trains to move intact to individual marine terminals.

As Exhibit 53 suggests, marine container terminals now do a significant amount of sorting to build trains that can move intact to inland points.

Exhibit 53: Conventional On-Dock Rail Operation

The disadvantages of this system are that:

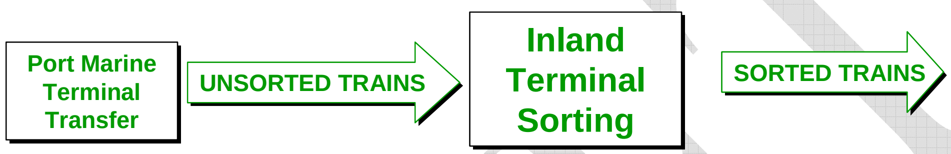
- Inland-bound rail containers that are not put on the first trains often have longer dwell times.

- Where rail volume is insufficient to make up an train or a block to a specific inland destination, those containers will usually be trucked to a near-dock intermodal yard.

At present, less than 20% of the rail volume is handled on-dock, the rest being trucked to intermodal terminals north of the ports.

In the kind of agile port operations commonly envisioned for inland ports (Exhibit 54), the marine terminals would load trains on a first-come, first served basis, regardless of destination. It is commonly supposed that this operating strategy would free up scarce marine terminal space by reducing dwell times and eliminate the need to dray containers to rail terminals.

Exhibit 54: Agile Port Operations



As implied in Exhibit 54, this concept would require additional handling at the inland port. It is implicitly assumed that this task could be done efficiently at an inland port that was designed for the purpose. This concept does, however, entail additional handling, cost, and delay as the price for improved marine terminal fluidity.

Terminals

Southern California marine terminals become more like Efficient Marine Terminals (EMTs) to the degree that they:

- move as many conventional marine terminal functions (particularly functions which require boxes to be held for a time) to an inland port; and

- maximize uninterrupted movement between ship and train based on improving real time data management capabilities.

The first objective requires an inland port terminal. Both tasks require systems and management which has been demonstrated and described in the Tacoma EMT project.

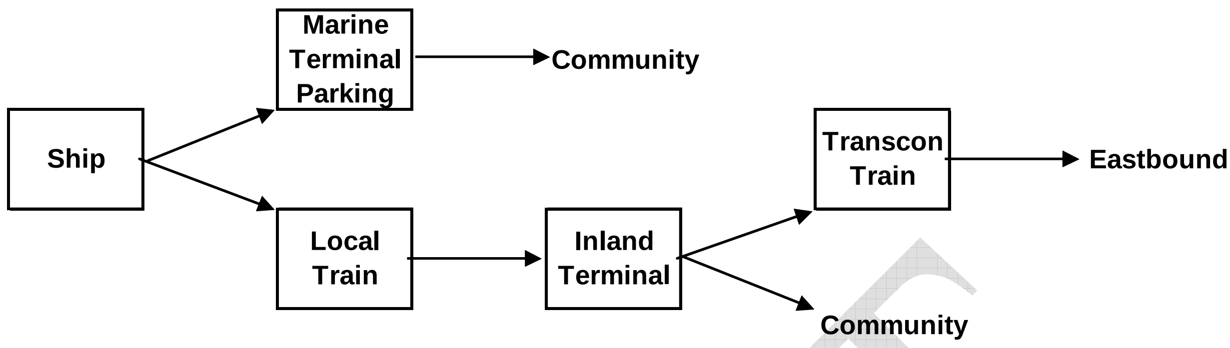
Basic Operational Concept

In the most basic operational concept (Exhibit 55) imported cargo that is unloaded from the ship would be segregated into two categories at the time of unloading:

- Local cargo would be parked in the marine terminal to await release to customers.

- Inland Empire and long-haul intermodal cargo would be immediately loaded onto rail cars and moved to the inland port. There it would be resorted into Inland Empire cargo (for local drayage) and into various blocks for eastbound movement (for onward rail movement). The local containers would move in bond and wait at the inland location for the various releases necessary prior to dispatch to the community.

Exhibit 55: Basic Agile Port Operational Concept



Conceptually, the simplest operation would be to unload every container from the shuttle train and reload those headed further inland by rail. This practice would permit optimum slot utilization of rail equipment. To the extent that intelligent blocking decisions can be make quickly in the marine terminal it may be possible avoid double handling some of the containers at the inland terminal, thereby permitting more sophisticated management of cost trade offs.

Actual operational complexity is increased because there are multiple origins in the port area. The simple solution and the one that optimizes the use of the marine facilities is to operate trains from each facility to the inland terminal as they become available for movement. That solution, however, does not optimize rail efficiency or make good use of rail track capacity. In practice some scheduling and block combination efficiencies are likely to be available to local management.

Further complexity is added because there are several railroads involved in the movement

- **Switching railroad –** Pacific Harbor Lines serving the port area
- **Passenger railroad –** sharing the railway with the Class I railroads
- **Class I railroads –** Union Pacific and BNSF each have individual commercial and operational considerations.

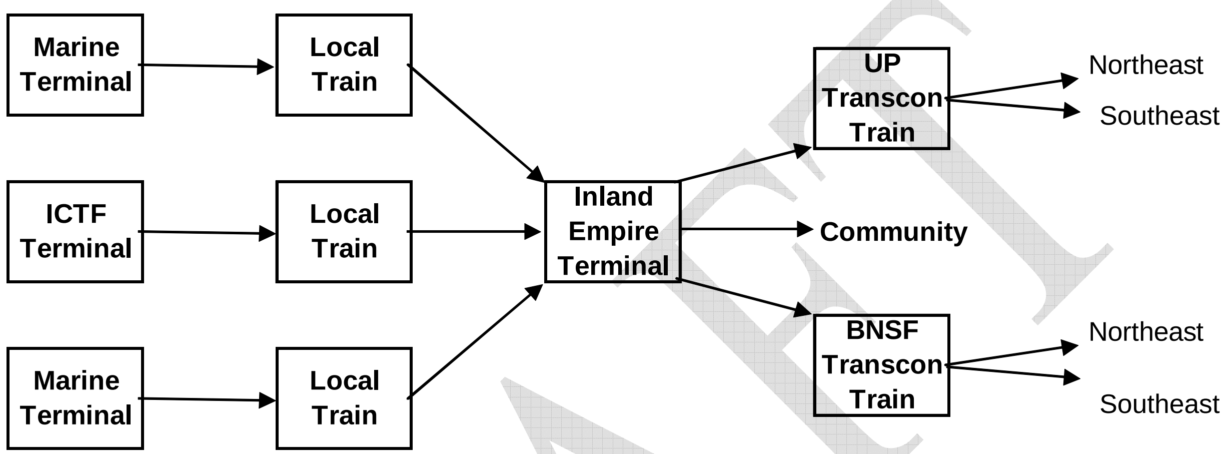
The complexity raises at least two important questions:

- Do the Class I rail carriers have sufficient common interests to agree with a single common user inland port terminal as a practical solution, or are separate terminals required for each rail carrier?
- Is additional capacity required on the lines that serve the Inland Empire and points east to handle the increased rail traffic associated with the improvement in marine terminal productivity and support of Inland Empire business,? Increased passenger demand may also require increased capacity.

Multiple Marine Terminal Scenario

Exhibit 56 illustrates the situation in which multiple marine and near-dock ICTFs generate local trains to a single inland terminal in the Inland Empire area. The main advantages of this option is that it only requires one common user facility and maximizes the traffic eligible for this new service benefiting both ports and both Class I railroads. The disadvantages include the complexity of joint operations and the number of trains required.

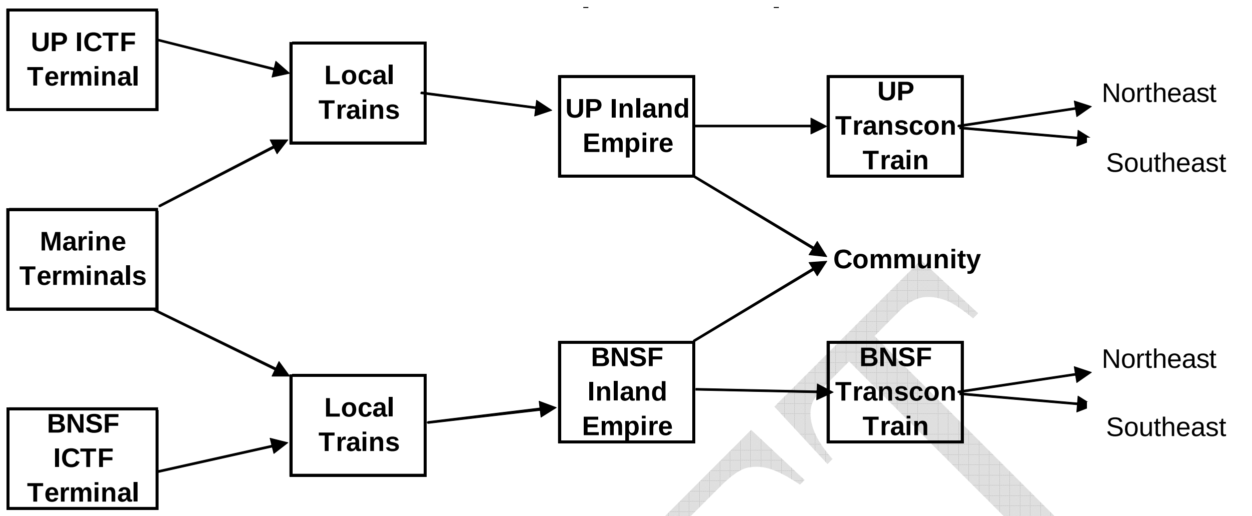
Exhibit 56: Multiple Marine Terminal Scenario



Multiple Inland Ports Scenario

Exhibit 57 illustrates the option in which multiple marine and near dock ICTFs generate local trains to a separate Inland Empire terminal for each Class I rail carrier. The advantages of this option are that it maximizes the traffic eligible for this new service benefiting both ports and both Class I railroads. As each railroad has its own facility it can structure the operation to meet its own needs. In addition this option allows the flexibility for one railroad to pick this concept and the other to pick a different concept. Presumably the railroads would be willing to contribute a bigger share of the up front capital to achieve this kind of flexibility. The disadvantages are the land cost and the need for two separate facilities.

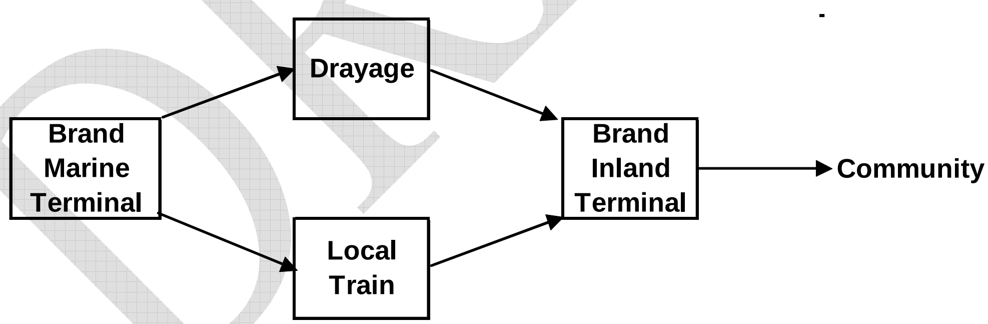
Exhibit 57: Multiple Inland Ports Scenario



Satellite Terminal Scenario

Exhibit 58 illustrates the option in which a particular marine carrier or terminal establishes an inland satellite terminal to relieve port congestion, akin to the Virginia Inland Port or the Metro-Port terminal cited in the case studies. This facility may or may not be rail served. This type of facility could be served by alternate rail technologies, such as RailRunner over less congested rail routes. The disadvantage is that this kind of operation is that absent significant public in-vestment/subsidies it might only be initiated after the marine carrier rerouted all possible discre-tionary cargo to other ports, and would only serve one carrier or marine terminal rather than all the terminals at both ports.

Exhibit 58: Satellite Terminal Scenario

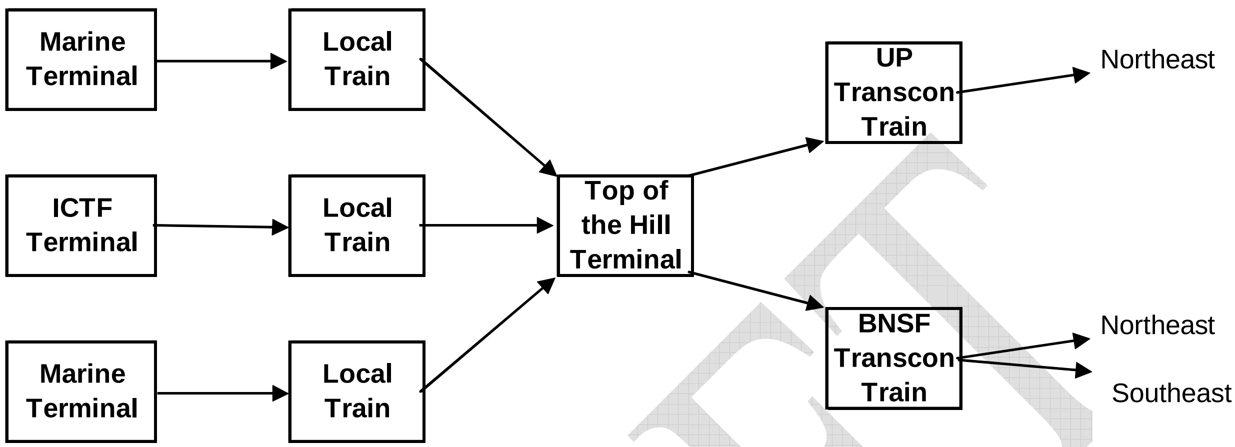


"Top of the Hill" Scenario

Exhibit 59 illustrates a common user facility located at the east end of Cajon Pass, in the vicinity of Victorville. This facility would likely be cheaper to build than an Inland Empire facility and could increase the efficiency of not only the marine facilities but also rail use of the Cajon Pass. This facility could function as an agile port sorting point, but would not be an efficient inland port to serve the Inland Empire. The main disadvantage of the option is that there is no LA Basin traffic congestion improvement and Union Pacific's southeastern traffic does not move over

Cajon Pass. This concept is likely to be perceived more favorably by BNSF than UP and might be developed as a BNSF terminal in conjunction with a UP inland empire terminal.

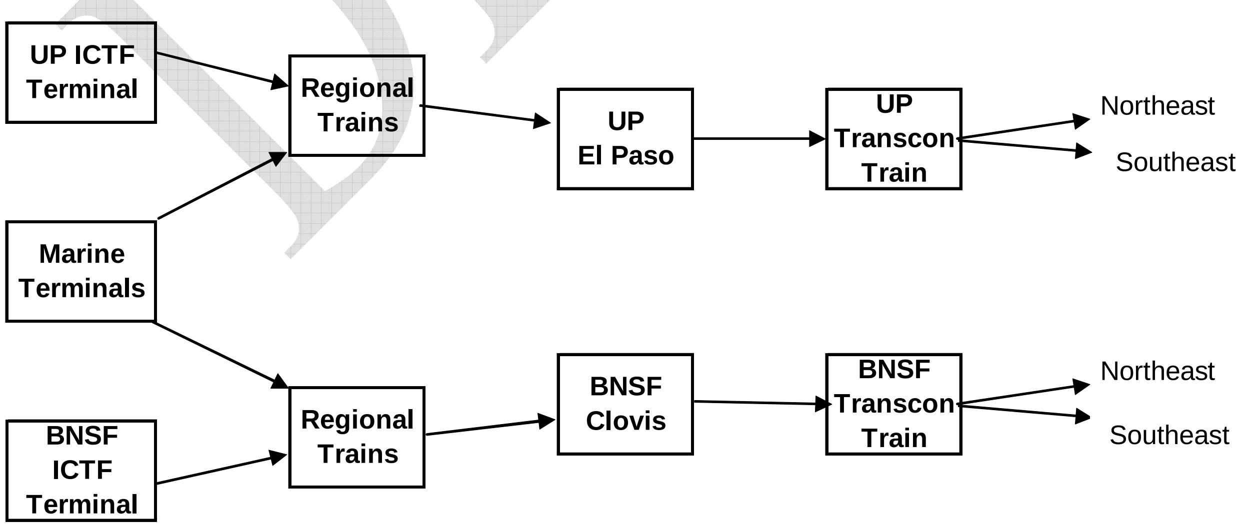
Exhibit 59: "Top of the Hill" Scenario



Far Inland Port Scenario

Exhibit 60 illustrates a scenario in which BNSF and UP move the intermodal "front door" of the port far inland, as far east as Clovis, NM or El Paso, TX. In the case of BNSF this is occurring today to a degree at Clovis, NM, where BNSF traffic to the southeast and northeast splits. BNSF is working to simplify and manage certain aspects of the movement between Clovis and Los Angeles. The matter is much more complex for Union Pacific. The closest UP equivalent point to BNSF's Clovis NM is El Paso TX. In order for this concept to have any validity for UP they would need to take the unlikely step of re-routing northeast-bound trains away from their preferred route through Salt Lake City for the purpose of optimizing marine terminal operations in Los Angeles.

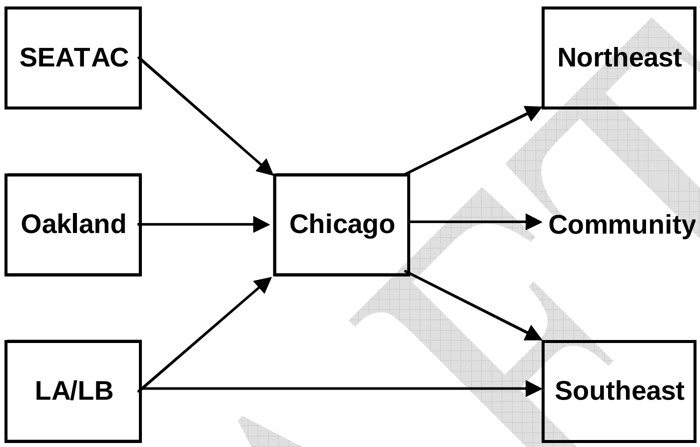
Exhibit 60: Far Inland Port Scenario



West Chicago Hub Scenario

Exhibit 61 illustrates the fact that Chicago is the next major sorting hub along the way east for most of the intermodal cargo leaving not only the LA basin, but all the major west coast ports. It should also be noted that there are far more destinations east of Chicago than west and the population/consumption is both large and dispersed.

Exhibit 61: West Chicago Hub Scenario



To the extent that terminals in Chicago are able to efficiently sort cargo bound for points east of Chicago, that function does not need to be performed in Southern California and LA/LB marine terminals can gain more throughput per acre. To the extent that a Southern California inland terminal can make blocks for locations east of Chicago, then the work required in Chicago is reduced. No analysis has been done to optimize this obvious tradeoff.

Exports

The movement of export, westbound cargo through this system is largely the mirror image of the preceding import discussion except in at least three respects.

- In order to optimize the marine terminal the inland port is expected to hold export cargo and deliver it "just in time" for the ship departure.
- There are a large number of empty containers moving in the system and the inland port may be required to hold these boxes for an extended length of time. It is likely to be the location that serves as the storage buffer for business cycles.
- Empty rail cars move into Southern California from points north, mainly via Cajon Pass. A likely function for the inland port is to be the buffer storage location for these cars and to the extent that inland locations east of Cajon are selected additional car storage is required. With an inland facility this storage does not need to take either potential marine terminal property or space at other congested city rail locations.

Need for Further Analysis

The basic premises behind the agile port concept and the differences between multiple agile port scenarios will be subjected to detailed analysis in the remaining study tasks. In particular, there is a need to quantify many of the critical factors:

- How many containers are or will be going to each major inland destination?
- How many trains can be made at the marine terminals under what circumstances?
- What additional port-area rail capabilities might be required to support agile port operations?
- Which of the different agile port scenarios are feasible?
- How much can be accomplished using existing terminal information systems?
- Which strategy maximizes total regional throughput?

VII. Case Study Findings

The Appendix presents 29 case studies of inland ports, logistics parks, and other related developments. The study team has attempted to draw out a few broad conclusions with implications for this project.

A Realistic Market Assessment Is Critical

The lack of a market assessment was a critical factor in the failure of the Neomodal project, and was probably a significant factor in the failure of the Port of Montana and Shelby, Montana projects. While a market assessment was prepared for the Albany, NY barge service, the large disparity between expectation and results suggests that the assessment was not realistic. The Kingman, Yuma, and Shafter efforts appear to lack formal market assessments. Unless remedied, this shortfall greatly increases the risk associated with those projects.

A realistic market assessment takes on additional significance when one goal of the project is to encourage new customer behavior, i.e. using a rail shuttle to the Inland Empire or locating a DC at an inland port.

A thorough and realistic market assessment is the foundation for a reliable business plan. Such a market assessment should cover at least these basic points.

- **Identification** of the customer base for the services to be offered. In a complex field such as intermodal freight transportation, it is particularly important to establish exactly who would buy the services or use the facilities, how many such customers exist, and where they are located.
- **Estimation** of total market size. If every potential customer took every opportunity to use the services offered, what would be the total volume?
- **Documentation** of customer decision factors and priorities. How do customers make their choices, and what is important to them? How do they balance cost, speed, reliability, convenience, simplicity, etc.?
- **Analysis** of competition and competitive response. What other choices does the customer have? What are the competition's strengths and weaknesses? How will the competition respond to the project?
- **Estimation of market share and volume growth.** Any new service or facility must progress from startup to maturity, gradually fulfilling its market potential. Implicitly assuming that the new service or facility will serve the entire potential market is a common mistake. It is also easy to ignore the adverse scale economies of small start-up volumes in large new facilities.
- **Identification of outside influences and risk factors.** Exogenous factors affecting the success of an "inland port" project could include fuel prices, ocean carrier routing practices, shipper relocation, competing projects, etc. Sensitivity analysis is the most common technique for this task.

Reality Checks Should Be Made Early In The Project Development Process

The commercial world of freight transportation and logistics is complex and changing. Even the most rigorous staff or consultant analytic efforts must be subjected to "reality checks" through contacts with potential customers, contractors, vendors, competitors, and other stakeholders. "Ivory tower" plans are inherently risky.

Involving commercial entities from the start is one way of maintaining contact with commercial realities. Several case studies note the importance of willing railroad participation. If railroads, ocean carriers, or other key participants are unwilling to participate the project sponsors should find that out at the beginning of the planning stage, not after a facility has been built.

Examples of analytic steps that require reality checks include:

- The use of averages for distances, costs, rates, or other key variables when the distribution of real-world values is skewed or divided.
- The use of past data that do not reflect significant recent real world changes.
- Assuming that competitors and other outside influences will maintain current business patterns and practices.

In each case, the lack of a reality check can set the project up for failure.

Project "Champions" Are Needed To Implement An Inland Port Initiative

Public agencies are rarely structured to initiate, build, and manage projects that must compete in the commercial world. The exceptions are usually port and airport authorities, and the case studies for VIP, Huntsville, and Metroport illustrate the successful "championing" of such agencies in inland port projects.

Public agencies created for the express purpose of developing and promoting an inland port or logistics airport have often been less successful. The Neomodal, Port Montana, Shelby, and Shafter projects are, so far, unsuccessful. It cannot be said with certainty whether the project concept was flawed, the organization was unable to carry out the project, or more time is required for ultimate success.

The most successful logistics park projects to date are the Alliance Texas and Joliet developments, both of which were "championed" by major business park development firms (Hillwod Group and CenterPoint). These and similar firms have a track record of assessing and acting on commercial opportunities and the "staying power" required for multi-year development efforts. Whether acting as master developers or in some other role, major development firms have other capabilities that public agencies typically lack.

- National and international marketing and sales staff.
- A portfolio of properties and projects.

- Contacts and credibility with major national firms (e.g. manufacturers, retail chains, 3PLs).

Successful Inland Ports Require Willing Carrier Participation

Early and willing railroad participation was a key factor in the success of the VIP, Huntsville, Joliet, and Alliance projects. The Shafter project lacks willing railroad participation and is attempting to force the railroads to participate. Other projects that anticipate rail service, such as SCLA, may find that service difficult to secure.

Service by cargo or parcel air carriers distinguish the airport projects with substantial cargo activity (Huntsville, Alliance, Rickenbacker) from those that have primarily attracted aircraft industry or ancillary businesses (SCLA, SBD, March).

The major factors in service decisions by all carriers in all modes are basically the same.

- **Volume.** The potential business volume must be sufficient to justify capital investment, equipment and labor time, and management attention. Whether the unit of service is a train, an airplane, or a delivery truck, there is a minimum volume threshold to engage the carrier's interest. The volume also determines service frequency and the possibility of attracting more than one carrier to obtain the benefits of competition. The central role of volume is one reason why market assessments are so critical.
- **Profit Potential.** Profitability may be influenced by volume, length of haul, balance, commodity, shipment size, and other factors. Profitability must be gauged in both an absolute sense (e.g. a minimum return on investment or operating margin) and relative to other carrier opportunities (e.g. compared to other business on the same railroad line or other stops for the same airplane).
- **Capacity.** Any carrier will want to insure that capacity used to serve the inland port project is not taken from more lucrative business, and that there remains a margin of capacity for foreseeable growth.
- **Network fit.** Railroads, airlines, and trucking firms are all network business, although the nature and flexibility of the network varies.

Railroads have a fixed network of lines, terminals and connections, and an operating strategy for using that network. A new proposed service that fits neatly into the network is much easier than a service that requires changes in the network, changes in other operations, or changes beyond the network. For example:

- The Keary-Worcester shuttle can accommodate small volumes of short-haul intermodal business because much of it moves as added cars on existing trains.
- The Detroit Intermodal Freight Terminal (DIFT) project stalled over the reluctance of Contrail to share Livornois Yard.
- The Neomodal terminal was located on the Wheeling and Lake Erie regional railroad, off the CR, CSX, or NS networks.

In the air cargo case, the issue is whether or not a flight to and from the proposed facility fits within the carrier's hub and spoke network. Specific factors might include:

- Distance and flying time between the project airport and existing hubs.
- Appropriate cutoff, departure, arrival, and delivery times.
- The schedules of existing multi-stop flights.

For rail intermodal, air cargo, and LTL trucking, the operative question is whether the relevant market is best served through the proposed new facility or via truck from an existing facility in the same region.

For a truckload carrier the decision is simpler. If profitable westbound loads from the project site can be matched with profitable inbound loads to customers nearby (or vice versa), truckload carriers who operate in the region will usually want the business. The balance of outbound and inbound loads is the critical factor. Where loads are imbalanced or the carrier must reposition the empty unit farther to obtain a balancing load, the carrier will demand a higher rate.

Long Development Times Should Be Anticipated

Most of the successful inland port developments described in the case studies have had long gestation periods. Of these examples, some appear to have been successful from the beginning and increased in scope over time while others took a long time – decades – to reach a sustainable business volume.

- Virginia Inland Port—planning began in 1984, opened in 1989, reached target volume in 1999.
- Alliance Texas—planning began in 1988, airport opened in 1989.
- Port of Huntsville—airport began operations in 1967, international air cargo service began in 1991.

For this reason it is difficult to label any existing project a permanent failure. A project may indeed be "ahead of its time", as Huntsville was, and eventually succeed as the market develops or other necessary changes take place. For a project to be a decade or more "ahead of its time", however, means that the land, capital investment, and other resources are unproductive for a long period and generating no public or private benefits.

The market assessment and business forecast are critical in deciding whether and when to start a project. Where project sponsors engage in overly optimistic "aspirational forecasting" public resources can be ill-spent. Forecasting is not an exact science, however, and project plans and financing should be sufficiently robust to sustain the effort through a slower than anticipated startup.

The Project Should Have A Clear, Valid Value Proposition

To complement the market assessment there needs to be a clear understanding of how the project proposes to create value for its customers. That "value proposition" must be verified in the marketplace, just as market assessments must be subjected to reality checks.

In the case of the all-cargo airports, some may have confused capability (i.e. a long runway and hanger space) with a value proposition (which must specify how those assets can be used to benefit the target customer).

Some of the inland port projects that seem to have stalled for commercial rather than regulatory reasons have vague or questionable value propositions. The Montana, Neomodal, and Battle Creek projects are examples.

The value proposition is a significant issue for proposed "Inland Trade Processing Centers" such as the Richards-Gebaur, Kingman, and Yuma efforts.

- Most "processing" is simply clearance by Customs though electronic systems with little or no onsite presence or employment.
- Most importers and exporters seek to minimize "processing", which they view as a cost factor rather than as source of value.
- The notion of trade processing as a source for employment or value might more narrowly include physical Customs inspection, FTZ operation, Customs brokerage, freight forwarding, etc.
- Security functions will not move inland.

Importers would prefer faster Customs clearance and the flexibility of in-bound or secured movement to inland alternatives to congested ports or borders. Customs and Border Protection would likewise appreciate additional processing capacity and flexibility. Neither importers nor CBP, however, are likely to pay for the use of inland facilities. Unless CBP can be induced to pay rent, ITPCs will not generate any revenue for their developers.

VIII. Matching Inland Port Goals and Concepts

A major objective for Task 1 and 2 of this study is to identify promising inland port concepts to be carried forward into detail feasibility and implementation analysis. The study team's review of case studies, SCAG objectives, and the regional context indicates that different but overlapping inland port concepts can serve the full range of SCAG's objectives and should be carried for ward into the balance of this study.

Truck VMT and Emissions Reduction

For the primary purpose of reducing net truck VMT – and therefore highway congestion and emissions – the "satellite marine terminal" model is the applicable inland port concept. The available data on port truck trips indicate an adequate market size to consider an Inland Empire rail shuttle linking a new inland port to the ports of Los Angeles and Long beach.

To determine the detailed feasibility of an inland port/rail shuttle development the remaining project tasks will need to analyze the following issues.

Location and site. BNSF has been frustrated in trying to expand their existing San Bernardino intermodal terminal or finding a site for a new one. BNSF is looking at the potential of SCLA for the future, but the SCLA location is not advantageous for a rail shuttle from the ports. Union Pacific has a candidate site at West Colton for the proposed demonstration project, but further analysis will be required to determine if the site is suitable for long-term development. If alternative line haul technologies (e.g. maglev or LIM) can provide access to suitable sites off the main railroad lines the choice of possible sites might be broadened.

Capacity. Both railroads are facing capacity limits on trackage between the ports and the Inland Empire, specifically on lines east of the Alameda Corridor. Grade separation projects as part of the Alameda Corridor East effort will increase safety but not rail capacity. The same routes are also involved in plans for increased regional rail passenger service. A public-private program to increase total rail capacity between the ports and the Inland Empire will almost certainly be a requirement for railroad participation in a rail shuttle.

Bobtail, empty chassis, and container depot trips. The effect of an inland port/rail shuttle combination on bobtail, empty chassis, and off-dock depot trips is not clear and will require more detailed analysis in subsequent study tasks.

Port rail operations and infrastructure requirements. Under both the "satellite marine terminal" and "agile port" concepts there is a presumption that the appropriate inland port trains can be efficiently assembled from two ports and multiple terminals. At a minimum, these operations will add time and cost that must be analyzed and incorporated in the feasibility assessment. At a maximum, there may be a need for additional rail infrastructure to accomplish this purpose.

Institutional issues. If operational and economic issues can be favorably resolved there are still institutional issues to be addressed. Such issues include the form and implementation of operating subsidies, jurisdiction and governance of an inland port, and the marketing and management of both rail shuttle and inland port facilities.

Market appeal and potential. The key question is how many container trips could be diverted to a rail shuttle. Contact with ocean carriers and customers who control the container movements will be required to assess the market potential and the rate and service combinations required to achieve target volumes.

Truck VMT and truck/rail tradeoffs. The potential for net VMT and emissions reductions depends on the relationship of inland port location to shipment origins and destinations. The net emissions reduction also depends on the tradeoff between reductions in truck miles and additional rail miles, including any port area switching needed to make up shuttle trains and inland port switching needed at the other end of the movement. The study team will develop a spreadsheet model of the tradeoffs and link it to the geospatial distribution of origins and destinations by TAZ.

Inland port/railroad relationship. Most discussions of inland port have implicitly assumed that there would be one such facility. There are, however, two competing railroads serving the Ports of Los Angeles and Long Beach. An inland port developed and served by BNSF would not be accessible to UP or to UP's customers, and vice versa. There are multiple possible scenarios to be considered in the balance of the project, including:

- Single inland port, single railroad access.
- Single inland port, dual railroad access with neutral terminal operator.
- Dual inland ports, one for each railroad.
- Single inland port served by contractor-operated rail shuttle over Class 1 tracks.
- Single inland port with maglev or LIM access.

Directing Economic Development

The operative questions for economic development goals are:

- What inland port features would be required to favorably influence economic development (beyond the expected influence of SBIA, March, and SCLA)?
- What would be an appropriate mechanism to provide such inland port features and to direct economic development accordingly?

Key elements identified from the case studies include:

- Realistic market assessment.
- Locations.
- The role of a development "champion."

The case studies also imply that significant shifts in economic development may occur slowly, over a decade or more.

Detailed analysis of the SCLA, SBIA/Alliance, and Mark GlobalPort projects will be required to establish the exact range of logistics elements offered in each location, and identify gaps that could be filled to direct economic development in desired patterns.

Port Throughput

The study team's preliminary review of "agile port" concepts identified the Efficient Marine Terminal (EMT) as most applicable to Southern California. Within the EMT concept, however, there are several alternative configurations and operating strategies.

The study team will create simple spreadsheet models of regional port throughput incorporating:

- Local and intermodal trade shares at marine terminals.
- On-dock and near-dock train loading options.
- Different conceptual locations and functions of inland ports/sorting yards.

The objective will be to match Southern California trade and operating conditions with the most promising EMT configuration.

Relocation of Ancillary Port Functions

In conjunction with the investigations of directed economic development and VMT reduction, the study team will consider the potential for relocating ancillary port functions, such as container depots at an inland port. This analysis will cover:

- Identification of ancillary port functions that could be beneficially relocated inland.
- Contacts with ancillary port function operators and customers.
- Assessment of likely VMT impacts.
- Discussion of potential locations and sites.